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LIGHTNING PROTECTION.

Of the electrical papers presented at the joint meeting of the American Institute of Electrical Engineers and the American Physical Society in Washington last week, the one dealing with the lightning protection of buildings created the greatest interest. It dealt with a subject which is of importance both to engineers and laymen and one whose mysteries have not yet been entirely unraveled.

The discussion of this paper resolved itself into an experience meeting and brought out evidence that a great many lightning discharges are probably non-oscillatory in character, although the existence of oscillatory discharges in certain instances is not denied. The requirements for a high degree of protection seem to be a number of rods extending considerably above the highest point of the building to be protected, and running as directly as possible to good grounds. The material of the rod is not very important, but a rod with a poor ground—that is to say one of high resistance—may be worse than no rod at all.

Various speculations have been made as to the sequence of events immediately prior to and during a lightning discharge, but as yet little definite information exists upon this point, even though some records have been obtained which indicate such steps as a preliminary brush discharge, the production of an ionized conducting path, and the supply of electricity for a series of discharges by the clouds adjacent to the point where breakdown occurs. The existence of a steep wave front in a discharge of this character might account for some of the observed effects which have led to the belief in an oscillatory discharge, while at the same time providing an explanation for the direct-current effects which have been observed. While the use of rotating mirrors or rotating cameras provides a means for obtaining intelligible records of lightning performances, the difficulty of foretelling the time of a discharge interposes great difficulties in the way of securing desired data. This element of chance in securing reliable records of the happenings involved in a discharge of lightning has greatly interfered with the study of this subject and the accumulation of information which would lead to a thorough knowledge of the facts and the formulation of a theory which would indicate how complete protection from harmful results could be secured.

The protection of transmission and distributing lines from lightning is a different problem. Unless

provided with an elaborate system of ground wires, such a line is pretty certain to be subject to induced currents from lightning discharges. Lightning arresters offer protection from such induction which is usually adequate, but when they protect from direct strokes of lightning it is usually at the cost of their own destruction. The choice of types of arrester for different services was fully discussed by Prof. A. H. Ford at the annual convention of the Iowa State Section of the National Electric Light Association. A report of this convention is given elsewhere in this issue and the rather full abstract of Professor Ford's address contains much information of value.

CONCENTRATION IN POWER SALES.

One of the essentials in extending central-station power service is the ability to concentrate upon particular features of the local power situation, spotting the weak points of the existing service and emphasizing the fitness of the electric drive as a means of bettering the conditions. The experienced power solicitor scents these weak points almost by instinct, and by constant practice even the man fairly new to the game can acquire much skill in their location. The winning proposition to install service is often built around one or two features of an established mechanical drive which the factory or store owner has never realized are grossly inefficient.

The investigation of steam leaks in old engines and of excessive condensation in cylinders and piping is a fertile field for study, as is the determination of power losses in belts, shafting and quarter-turn pulley combinations. Few factory owners realize the amount of coal required to transmit their mechanical power from a basement engine to the line shaft of a distant department compared with the additional demands of the productive load at the machines. A hasty survey of a plant should suffice to "tip off" the power engineer as to the existence of a relatively large friction load, and by the simple expedient of taking indicator cards during the noon hour and in the full working periods the basis for many a clinching power proposition is at hand. It is well for the central-station man to realize that it is not always necessary to present the prospective customer with the ultimate figures of estimated electric-service economy in order to win the business. That is, he may carry a power survey far enough to demonstrate a highly favorable showing by the adoption of electricity; but he need not show the desired customer the full saving to be expected in every case if the business seems to be coming along on the strength of more modest benefits to the consumer. It is better, in other words, to capture a power installation upon an underestimate of the profits of electric service than to promise the prospect very large immediate savings which may be realized if the equipment is given a fair show but which may not be realized if it is subjected to abuse or improper service demands.

It is in working along such lines that concentration of effort pays. The handling of the fuel may be extremely inefficient; untoward prices may be paid for water or the disposal of ashes; inadequate maintenance may be causing frequent costly breakdowns of pumps and engines; or the intermittent service may be a factor in the high cost of operating the mechanical plant. Some of these features often can be improved without the substitution of electric motors, but the wise central-station man will content himself with comparing conditions as they are under mechanical drive with conditions as they may be if electricity is substituted, and will confine his efforts to giving the customer the best and most economical service possible rather than to pointing out desirable betterment work in the mechanical rearrangement of old plants run by competitive motive powers.

No one can study electric power applications long without being convinced that even a rehabilitated mechanical plant can scarcely hope in the long run to make as good a showing on total yearly cost as the same plant equipped with a properly designed motor drive. Let the central-station man seek to benefit his customer as much as possible by studying his service after the motor installation is made as well as before, but let the power solicitor new to the business keep a close control of his promises as to sweeping and extreme economies to immediately result from the adoption of electricity. Far better is it to let the consumer find out some of these economies in his own bills, so long as a sufficient margin demonstrated by the electric-service estimate leads him to decide in favor of the electrical installation.

WEATHER CONDITIONS AND LINE DESIGN.

The importance of a thorough study of weather conditions in connection with the design of transmission lines led to an extended investigation of the subject last year by Mr. Ira W. Knight at the Massachusetts Institute of Technology in connection with postgraduate thesis work in the Department of Electrical Engineering. The results of the author's work, which includes a graphic analysis of weather conditions at 105 stations of the United States Weather Bureau for the years 1901 to 1911, and a résumé of the most extreme conditions that have been recorded since the foundation of the various stations, cannot be reprinted here, but the data obtained emphasize the desirability of more thorough reports by operating companies upon sleet formation and wind velocities, and the need of delving with great care into local temperature, thunderstorm, and wind-direction records in determining the factor of safety desirable for transmission lines in various parts of the country.

In a report on "Transmission Line Crossings" presented at the National Electric Light Association's 1910 convention, the committee approved an allowance of not over 0.5 inch of clear ice on lines, and stated that indicated wind velocities of from 65 to 75

miles per hour may be expected several times each year, though much less frequently in conjunction with sleet. The question that naturally arises is how nearly these assumptions represent actual conditions, both with respect to the extremes chosen and in regard to the liability of their simultaneous occurrence. A new company building a new line in an unestablished field can ill afford to spend the capital necessary to so construct the line that it will withstand a 60-mile gale with 0.5 inch of ice on a day when the temperature is —20 degrees, if such an extreme condition has never occurred in that locality. In fact, if it were known that the general high wind velocity in the region is only 40 miles per hour and that velocities of 60 miles and over have occurred only once or twice in 30 years, a new company with little capital but good earning prospects perhaps could well afford to design its line for the lower velocity. There would be some little risk of failure, but this would be balanced against the saving in initial investment. The judgment of the designer here comes into play, reinforced, however, by available statistics. From such data as Mr. Knight has compiled or from similar tabulations which can be collated from Weather Bureau records and plotted in various ways on maps and cross-section paper, the transmission engineer can tell at a glance just what are the severest conditions that have ever occurred in any section of the United States; how often they are liable to re-occur; and to what extent the various worst conditions occur simultaneously.

An interesting feature of the investigation was a study of the experience of about a score of transmission systems with ice and sleet formations on wires. Trouble seems to be concentrated in three regions: the Atlantic seaboard from Georgia to Massachusetts; the vicinity of the Great Lakes, particularly northwestern New York; and the north Pacific Coast. The thickness of the ice formed is independent of the material of the wire and is also independent of the voltage on the line at the time, at least up to the corona point. Observations up to 22,000 volts uphold this view. It is not known whether the formation of corona tends to ward off the collection of sleet, but it has been noticed that for a considerable formation of sleet the charging current on the line is doubled. The cross-section of ice varies from round to unsymmetrical oval shapes and ice tends to form thicker at the bottom of long spans. The ice may be melted from the wires in cases where enough current can be transmitted to raise the wire temperature above the freezing point and it is desirable to consider the strains resulting from uneven melting in the design of line structures. With a considerable wind velocity the ice forms thicker on the windward side of the wire. It is noteworthy that ice one or two inches thick, sometimes rising to several inches, is not uncommon in the experience of the companies in the Rocky Mountain states.

THE DECREASING COST OF POWER.

Attention has frequently been called to the fact that the cost of generating power from fuel shows a continual decrease. Two principal reasons given for this are the increasing efficiency of prime movers as designs are improved, and the increasing size of prime-mover units, which not only aids the attainment of higher efficiencies but makes the initial cost of the machine less per kilowatt, and consequently decreases the item of fixed charges, which must be considered in the estimation of the total cost of generating power.

The increased efficiency of prime movers acts in an indirect way to still further decrease certain items of cost. During the last ten years the steam consumption per kilowatt-hour generated under the most economical conditions by steam turbines has been reduced by about one-third of its former value. This means much more than a saving in coal. It means that the boilers and other steam-generating equipment need have a capacity only two-thirds as great as formerly for a station of the same output. Similarly the condensing facilities are required to care for only two-thirds as great a quantity of steam and the expense for this part of the installation is correspondingly reduced. The fixed charges against these portions of a steam station are reduced in direct ratio to the cost of equipment.

Contemporaneous with the improvement in steam consumption of steam turbines, there has been an improvement in the methods of firing steam boilers, so that boilers may fairly be given a higher rating today than was suitable ten years ago. This again means less investment in boilers for the same output.

These decreases in capacity of steam-generating and condensing equipment carry with them a lessened requirement in capacity of buildings and in amount of land needed for a given power output. This means another saving in fixed charges. Putting it in another way, it has been possible to largely increase station capacity without enlarging buildings or adding to the installation of boilers. In addition to all this, the cost of water for condensing purposes, where such water must be purchased, is correspondingly decreased.

The above goes to show that the increase in efficiency of steam turbines has acted to decrease the cost of power not only in the lesser requirements for coal and coal-storing and coal-handling facilities, but also indirectly from its effect upon the fixed charges for buildings and steam equipment.

All of this applies, of course, only to the cost of power at the point of generation and it has made the hydroelectric plant a much less formidable competitor to the steam plant than was formerly the case. It must be remembered, however, that the cost of power where utilized involves a considerable outlay for distribution expense, which sometimes involves a transmission line.

Many Contracts Closed for Chicago Electrical Show.

Notwithstanding the fact that Chicago's seventh annual electrical show is still about six months in the future, there is a gratifying preliminary demand for space. The directors decided to make an early campaign owing to the intervening summer months, with the idea of getting contracts rounded up before the outing season begins. The show is set for October 31 to November 14.

Among the contracts already secured by Manager Homer E. Niesz are those signed by the General Electric Company, Westinghouse Electric & Manufacturing Company, Simplex Electric Heating Company, National Electric Lamp Association, Pelouze Manufacturing Company, Federal Sign System (Electric), Electric Storage Battery Company, Commonwealth Edison Company, Electrical Testing Laboratories, Hughes Electric Heating Company, American Telephone & Telegraph Company, Chicago Telephone Company, Fort Wayne Electric Works, Birtman Electrical Company, ELECTRICAL REVIEW AND WESTERN ELECTRICIAN *Electrical World*, *Popular Electricity*, and others. Many of these concerns have taken more space than they used in the last Chicago show. The offices of the Electric Show are in the new Edison Building 72 West Adams Street, Chicago, where diagrams of the floor space and other information may be secured.

Utah Society of Engineers.

The annual banquet and meeting of the Utah Society of Engineers was held at the Hotel Utah, Salt Lake City, on April 17. Ledyard M. Bailey was toastmaster and addresses were made by A. S. Peters, chief engineer of the Mountain States Telephone & Telegraph Company, retiring president; W. W. Armstrong, president of the National Copper Bank; W. J. Barrette, president of the School Board; John C. Howard, president of the Utah Oil Refining Company.

Following the banquet, the annual election of officers were held. Sylvester Q. Cannon, city engineer of Salt Lake City, was elected president. The other officers chosen were: Samuel S. Arentz, chief engineer of the Interurban Construction Company, vice-president; Frank W. Moore, architect, secretary; L. H. Jones, of the city engineer's staff, treasurer.

Kentucky Workmen's Compensation Act.

Every manufacturer of electricity or electrical appliances in Kentucky who has more than six people on his payroll constantly will be subject to the provisions of the new Workmen's Compensation Act which was passed by the last State Legislature. It becomes a law on June 16, but does not become effective between the employers and their employees until the first of next January.

Electrical Day at Portland Ad Club

Electrical Day at the Portland, Ore., Ad Club's luncheon at the Portland Hotel on April 8, brought out an attendance that crowded the large main dining room of the hotel to its capacity.

The combined electrical interests of Portland were in charge of the arrangements for this day, with C. C. Craig, sales manager of the Northwestern Electric Company, as chairman of the day. Many amusing features were developed during the luncheon, among them the mock contest for the chairmanship between A. C. McMicken, sales manager of the Portland Railway Light & Power Company and C. C. Craig. Mr. Craig, after winning out, indulged in a touching tribute to his rival.

Another feature was the electrical contractors' efforts as producers of harmony—in the form of a band concert—but it was soon discovered that the melody proceeded from a band stationed behind a screen and the contractors succeeded in having themselves ejected.

The dining room was attractively festooned with varicolored incandescent lamps and other lighting effects. A number of interesting high-frequency experiments were performed in the center of the room under the direction of a red-garbed devil, with effects startlingly realistic.

The French inventor, Prof. Henri Jacques Boissant, demonstrated and explained his new talking arc lamp. Thomas Drier, editor of *Associated Advertising*, then gave a very interesting talk. It was a much enjoyed occasion throughout and the electrical people earned the appreciation of all present for the elaborate arrangements made.

Summer School at Wisconsin.

The fourteenth annual summer session of the College of Engineering of the University of Wisconsin will open on June 22 and continue for six weeks. Special courses of instruction and laboratory practice are offered in electrical, hydraulic, steam and gas engineering, mechanical drawing, applied mechanics, testing of materials, machine design, shopwork and surveying.

Students interested in this work may secure detailed information regarding the proposed classes by addressing F. E. Turneaure, University of Wisconsin, Madison, Wis.

Chicago Jovian Meeting.

At the meeting of the Jovian League of Chicago on April 27, R. J. Sewart, of the H. W. Johns-Manville Company presented a paper on the Audiffren refrigerating machine, in which he described in detail the construction and operation of the machines and their wide application.

Preceding the paper, Joseph Fowler, Jovian statesman from Memphis outlined the activities of the local Jovian league. This League is taking a part in the civic affairs of the city and is accomplishing much good. An electrical show will be held in Memphis in June under the auspices of the League.

John G. Learned, of the Public Service Company of Northern Illinois presided at the meeting.

Jovian Electrical League of Southern California.

At the weekly luncheon held on April 22 at Los Angeles, Cal., by the Jovian Electrical League of Southern California, District Attorney Joseph W. Ford delivered an address on the "Duties and Responsibilities of a District Attorney." Mr. Ford related some of his experiences, both tragic and humorous. The chairman of the day, Harry W. Harrison, also furnished some high-class cabaret entertainment.

A rejuvenation will be held at the Clark Hotel, Los Angeles, Friday evening, May 15. It is expected that at least 40 new members will be initiated at that time.

Utah and Idaho Jovians Celebrate.

On April 18 a fine rejuvenation of the Jovian Order was held at Pocatello, Idaho. James B. Brockaw, statesman for Idaho, was in charge and was assisted by A. E. Smith, A. L. Faber and H. F. Holland, of Salt Lake City, Utah, and E. A. Wilcox, of Twin Falls, Idaho.

On the evening of April 21, following the conference of Utah Power & Light Company representatives at Salt Lake City, Utah, a very successful Jovian rejuvenation was held. Statesman John C. Jones, of Utah, was in charge. He was assisted by several very active committees.

Handbook of Jovian Procedure.

The Jovian Order has published a handbook of Jovian Procedure, covering in minute detail all the duties of a Jovian Order and Jovian rules and procedure covering every contingency which may arise in the prosecution of Jovian work. There is also a considerable portion of the book devoted to suggestions for increasing local membership and information with respect to building up attendance and creating practical development work.

Godfrey H. Atkin.

The electric storage battery is one of the earliest practical devices related to the commercial development of the electrical industry. In fact, there was a time, as we all well know, when this source of electrical energy was considered to be the first and last word in this development. However, with the invention and design of other forms of apparatus for the generation of electrical energy there has been a corresponding development of the electric storage battery and today we find it occupying a most important and necessary place in the field of power production, and while from the technical standpoint the storage battery has been greatly improved since the earlier types, the commercial feature of the storage battery has experienced just as great and significant a development. New uses for the equipment and enlarged ideas with respect to ultimate service have been due in a great measure to the men who have had the responsibility of making the electric storage battery a commercial success. Conspicuous among those who have contributed to the position the electric storage battery now holds in the electric field is the subject of this sketch, Godfrey H. Atkin.

Godfrey H. Atkin,
Manager of the Chicago Office of The Electric Storage Battery Company.

Mr. Atkin was born in England in 1866, and his British parents christened him Godfrey Harold. He is better known, however, among a host of friends in the electrical fraternity as "Tommy." "Tommy" began his career with the Thomson-Houston Electric Company in the little old Michigan Avenue shop in Chicago in 1890, and he has been identified with the electrical industry ever since. For the past 12 years he has been manager of the Chicago office of the Electric Storage Battery Company, of Philadelphia. This office controls the sub-offices at St. Louis and Denver. In 1902 Mr. Atkin's office had four employees. There are now 21. At that time the only Exide depot was in a part of an automobile-equipment store back of Michigan Avenue, and the force consisted of one man. The Exide Depot in Chicago has been increased until it now takes 60 employees to keep things going.

Mr. Atkin is broad shouldered and energetic. His enterprise is well known and his genial good nature is a happy feature of the gatherings of electrical men at state and national conventions. Always popular, he has taken an active part in electrical affairs and in connection with Chicago conventions of electrical men he has always carried a large part of the responsibility for the comfort and edification of the visitor to the city. He has been vice-president of the Chicago section of the Electric Vehicle Association; president of the Railway Electrical Supply Association; one of the promoters and at present a director of the Electrical Trades Exposition Company, under the auspices of which the six big electrical shows have been held in Chicago.

He is a member of the Chicago Athletic Association, the Midday, Evanston Country, Evanston Golf, Evanston Yacht, Chicago Yacht and Royal Canadian Yacht Clubs. He is an ardent sailor and is owner and skipper of the schooner *Nomad* and Fleet Captain of the Chicago Yacht Club.

Empire State Meeting.

The spring meeting of the Empire State Gas and Electric Association was held at the Alerts Club, Medina, N. Y., on April 22, there being about 100 people, representing 50 or 60 companies present. J. T. Hutchings, president of the association, occupied the chair at both sessions of the meeting.

At the morning session the speakers were: Assemblyman Cyrus W. Philips, of Rochester; Edgerton Parsons and Mr. Belden, of Buffalo, all of whom spoke on the subject of the new workmen's compensation law, which is going into effect in New York State on July 1, 1914. Mr. Philips explained many of the important features of the law and answered numerous questions in regard to them. Mr. Belden discussed the subject from the standpoint of the liability insurance company and Mr. Parsons explained a plan for mutual insurance for the gas and electric companies of the state.

At the close of the morning session luncheon was served to the delegates at the Alerts Club, following which they were taken to the power house of the local company and to other points of interest in the town.

Upon reconvening for the afternoon session some time was devoted to discussion of the water power situation, both as regards proposed legislation in this state and pending legislation at Washington. The association's Safety Committee submitted a brief report indicating the work which the committee had undertaken.

The delegates extended a hearty vote of thanks to A. B. Swett, president of the Swett Electric Light & Power Company, of Medina, and to his associates, as well as to the speakers of the day.

Los Angeles Jovians Discuss City Planning.

John E. Lathrop, of New York City, director of exhibits for the American City Bureau, gave a very interesting and forceful lecture at the regular weekly luncheon of the Jovian Electrical League of Southern California, held at Los Angeles on April 15. The subject of "City Planning" was covered very thoroughly and the need of Los Angeles for a definite scheme of segregation for factories, homes, schools, etc., was discussed. Mr. Lathrop predicted that a city plan commission would soon be appointed in Los Angeles. This will be a valuable addition to the city government in view of the great problem which the city will face upon the opening of the Panama Canal. Miss Stafford, whistling virtuoso, entertained.

Gas Engines versus Steam Turbines for Steel-Mill Plants.

A joint meeting of the Chicago Section, American Institute of Electrical Engineers, and the Electrical Section, Western Society of Engineers, was held on the evening of April 27 in the rooms of the latter society, Monadnock Block, Chicago. D. W. Roper presided.

The paper of the evening was entitled "Power Problems in Steel Mills," and was presented by F. G. Gasche, of the Illinois Steel Company. This paper dealt almost exclusively with the question of prime movers for steel-mill plants and discussed the relative advantages of the gas engine and steam turbine for this purpose. Mr. Gasche pointed out the descrepancy between the expected and the actual performance of gas engines supplied with blast-furnace gas. He discussed the thermodynamic efficiency of the two types of units and stated that in a run of about three months of a plant operating with gas engines under the best conditions, the efficiency of these units was 19.2 per cent, compared with something over 50 per cent theoretical. He called attention to the high temperature of the exhaust gases from the gas engine.

The efficiency of steam turbines is steadily being increased and he looked forward to a still further increase by making use of higher temperatures of superheat, so that the efficiency of the turbine unit will gradually be brought up to that of the gas engine.

Turning to installation costs, Mr. Gasche pointed out that a gas-engine equipment cost about $100 per kilowatt; whereas, a steam-turbine installation for identically the same plant would cost but $55 per kilowatt. In a typical plant operating gas engines about 6,000 hours per year, the operating cost per kilowatt per year would be $8 and in a corresponding turbine plant, $13.10. On adding to these operating costs 15 per cent fixed charges there would still be left a balance of $1.65 per kilowatt per year in favor of the steam turbine.

The operating characteristics of gas engines are far from ideal, considering the widely variable and quickly fluctuating character of the load of a steel mill. The time lag of a four-cycle gas engine is so great that anything like regularity of speed is impossible, which is still more objectionable in an alternating-current plant. Gas engines, moreover, have low efficiency at low loads. The total efficiency of a gas-engine unit at 70 per cent load-factor is only about 16 per cent, compared with 19.2 per cent when operating under ideal conditions of constant full load. Therefore it is the best practice to use steam turbines to carry the peak loads and to make up the deficiency in generating capacity that has been noticed in practically every gas-engine installation for steel-mill service.

The discussion was opened by W. B. Jackson, who stated that he had not felt it wise to advise any of his clients to use gas engines on a large scale. However, he pointed out that the gas engine by achieving a higher efficiency of conversion of the potential energy of the fuel to the electrical energy at the switchboard is an important step in the right direction. It may be possible in the future to secure an energy conversion direct from the fuel to electricity of higher efficiency than is now attained from the mechanical energy in the shaft of the generator to the electrical energy at the switchboard.

Taliaferro Milton called attention to the value of a storage battery as an auxiliary to a gas-engine installation in keeping the load very nearly constant on the engines. Referring to the installation at Gary, Ind., he pointed out that the battery there serves admirably in reducing the sudden peak loads and in equalizing the service.

E. W. Allen said it must be admitted that there has been an advance in gas-engine practice. However, very sudden fluctuations of 30 per cent on either side of the average load are very common in steel-mill practice. It is possible to use a storage battery connected through rotary converters to the alternating-current buses but the additional equipment added to an installation already representing very high initial cost would make the total cost practically prohibitive. Therefore, a steam-turbine reserve is almost always essential to take care of the violent fluctuations of load and permit the gas engines to operate more nearly under their best conditions. He looked forward to considerable advance in steam-turbine efficiencies, particularly from the suggested combination mercury and steam turbine unit that is being developed by Mr. Emmett.

O. H. West said he felt called upon to say a few good words on behalf of the gas engines. The engines at the Gary plant can be started from standstill and synchronized in something like 30 seconds. The objection that Mr. Gasche had raised to the high temperature of gas-engine exhaust can be done away with by utilizing the latter for developing steam for turbine auxiliaries. In recent years the governors of gas engines have been very decidedly improved, so that their regulation is much better than was the case formerly.

Mr. Gasche replied to some of the points raised by stating that he thought it feasible to utilize an initial temperature of 1,000 degrees Fahrenheit, or even higher, by means of superheating the steam for turbine use. This, together with other refinements in turbine practice, will not only increase the thermodynamic temperature range of these units but also improve their operating performance in other ways. Relying to questions raised by Messrs. Wait and Roper, he stated that in a plant where gas engines were to be used it would be desirable to have at least 30 per cent of the generating capacity driven by steam turbines. Replying to some remarks on the use of flywheels that had been made by Mr. Sykes, he said that great inertia is necessary in all steel-mill motors, particularly those used for operating rolling mills. If massive rotors or separate flywheels were not provided for these machines the stress fluctuations would be so violent as to tear the machine to pieces. He stated further that it is true that much advance has taken place in gas-engine practice, particularly in the operation of these machines under severe conditions. While it is possible to use the engine exhaust for developing steam in low-pressure boilers, the cost of the additional equipment would be greater than the benefit derived.

Utah Electric Club Discusses Panama Tolls.

At the regular weekly luncheon of the Utah Electric Club, held at Salt Lake City, April 16, Judge C. S. Varian read an able paper prepared by him especially for the club on the Panama Canal tolls question. Judge Varian traced the history of negotiations from the time that an isthmian canal was first considered down to the present day. He quoted copiously from presidential messages, state department papers and treaties, which indicated clearly that it had been the intention of the United States Government long before it had itself considered the proposition of building a canal to so arrange matters that, by whomsoever the canal was built, it should be maintained and operated entirely neutral. He maintained very strongly that both by treaty and by moral obligations, the United States should not exempt coastwise vessels from tolls.

Oklahoma Gas, Electric and Street Railway Convention.

The Gas, Electric and Street Railway Association of Oklahoma, will hold its third annual convention in Oklahoma City, Okla., on May 13, 14 and 15, with headquarters at the Lee-Huckins Hotel. An interesting series of papers has been prepared for the convention, among them being one by Corporation Commissioner G. A. Henshaw, and another by W. J. Norton, editor of *Rate Research*.

Iowa State Section, National Electric Light Association.

Fourteenth Annual Convention, Cedar Rapids, Iowa, April 22, 23 and 24.

The fourteenth annual convention of the Iowa State Section of the National Electric Light Association was held in Cedar Rapids, Iowa, April 22, 23 and 24, headquarters being established at the Montrose Hotel. During the week also the tenth annual meeting of the Iowa Street and Interurban Railway Association was held, and also the second semi-annual convention of the Iowa Electrical Contractors' Association, the latter holding two parallel sessions with the central station. The opening session was called to order by A. L. Dodd, of Charles City, president of the Association, who presented the annual presidential address. In his introductory remarks, Mr. Dodd paid a tribute to the late George Westinghouse, and briefly reviewed some of the events of his career.

The nitrogen-filled incandescent lamp was referred to by Mr. Dodd as one of the greatest developments of the year in the electrical industry. He stated that there are many in use in Charles City which are operating satisfactorily in both indoor and outdoor service. He held that these lamps were the greatest weapons so far developed with which to successfully combat the so-called gas arcs.

Speaking of conditions in the state, Mr. Dodd said that the increase in the number of municipally owned plants in some localities was significant and should be seriously considered by all companies in the state. He urged that utilities take an active part in civic affairs and extend the lowest consistent rates for city pumping and street lighting service. This, coupled with good service and equitable rates to all customers, will have a strong influence in discouraging municipal ownership. Mention was made of the Society for Electrical Development as an influence for good in the electrical industry and all companies were urged to take an active part in the affairs of this organization.

It was pointed out that the tendency of the times is toward consolidation of the smaller companies, and mention was made of the economies that can be effected by such mergers. Mr. Dodd ventured the opinion that the entire state could be profitably supplied from two or three large generating stations.

In conclusion, he referred briefly to the regulation of utilities by state commissions and urged the companies represented in the Iowa Association to co-operate in having a good utilities' bill presented to the Legislature.

The Nominating Committee, composed of Austin Burt, M. A. Harrison, H. C. Blackwell and H. O. Brownell, was then appointed.

Secretary H. B. Maynard, of Waterloo, then presented the report of the secretary-treasurer, which indicated a substantial growth of membership and a flourishing financial condition.

At this point Fred Benson, of the General Electric Company, was called upon for a few remarks relative to the new high-efficiency incandescent lamps. Mr. Benson urged particularly that the new lamps should not be referred to as nitrogen-filled or nitrogen-gas lamps. These lamps are now made in sizes from 750 to 1,000 watts for multiple service, and 5.5, 6.6, 7.5 and 20 amperes for series street-lighting circuits. 400 and 500 multiple lamps will soon be available. Mr. Benson referred briefly to some of the uses for the new lamps and pointed out that they were particularly desirable for use in street lighting when such service is furnished on a candlepower basis.

E. O. Switzer, of the Westinghouse Electric & Manufacturing Company, discussed Mr. Benson's remarks, calling attention to the fact that the efficiency of the metallic-flame lamp compares favorably with that of the new high-efficiency incandescent lamp. He also stated that the cost of cleaning and renewing the incandescent lamp could be compared with the cost of trimming the arc lamps, and he strongly urged that the four-ampere luminous arc should be given consideration for street lighting purposes. He thought that the incandescent lamp would eventually find a greater field for indoor illumination.

The paper entitled: "The Society for Electrical Development," by J. M. Wakeman, was then read by Secretary Maynard. This paper outlines the plans of the Society and asks for the co-operation of all companies and individuals allied with electrical work.

At the afternoon session a paper entitled "Co-operation Between Contractors and Central Stations" was presented by J. T. Marron, of Rock Island, Ill. This paper comments at some length on the relationship which should exist between the central-station company and the local electrical contractors, and the good that can come from close co-operation. The utility company should cultivate the friendship and co-operation of the contractors by refraining from doing any interior wiring and by maintaining standard prices on devices that are sold.

On the other hand the contractor should see that all wiring is done in the best manner and that all specifications are complied with. Sufficient outlets should be provided so that the service will be as convenient as possible to the user and this also makes for a greater use of electricity.

It is essential that central stations and the contractors meet at least once each week and discuss plans for securing new business and other mutual subjects. Mr. Marron thought that the contractors were considerably to blame for the lack of harmony which has previously existed and that due to the efforts of the various organizations both national and local, this condition is fast disappearing. Co-operative advertising by central stations and contractors was advocated as an economical and satisfactory plan.

Mr. Marron thought that jobbers of electrical material should curtail credit extended to the so-called curbstone contractors and in this way encourage the legitimate firm which is endeavoring to do its work in the best possible manner. In conclusion he thought that the central-station companies should encourage the establishment of electrical stores and through these bring to the attention of the public the great number of electrical devices suitable for domestic and commercial use.

In commenting on Mr. Marron's paper, A. L. Dodd, of Charles City, explained that the local central station turns all wiring over to the local contractors and in addition, pays 10 cents for each outlet wired. In addition to stimulating the wiring of a greater number of outlets, this plan creates good feeling between company and contractors.

George A. Wrightman, of Des Moines, then presented a paper entitled "The Compensation Law and Its Application." This paper was divided under two general headings, (1) fundamental principles of the Iowa law which is to go into effect on July 1, 1914; and (2) liability insurance as affected by this law. Mr. Wrightman stated that the law about to be enforced is extremely simple, and there are only a few fundamental clauses that need be remembered by employers of the state. In the first place, every employer is assumed to have elected to come under this law unless notice to the contrary is given.

The next general feature is that the

law provides a specific schedule of payments to be made which vary according to the injury sustained by the workman. Under the old liability law there was practically no limit set for the payments that could be ordered by juries, and this feature of the new law makes it possible for an employer immediately after an accident to know exactly what his liability will be. Also, under the new law, litigation is practically eliminated and no extensive law suits will be necessary.

The third general feature is that employers may insure under the law and thus provide against unexpected expenditures that may be caused by a serious accident.

Mr. Wrightman stated that there are approximately 25,000 employers in Iowa and so far no instances of anyone refusing to come under this law has come to his notice. He explained that if an employer should elect not to come under the new law he would be prohibited from using the three old common-law defences. He stated further that such an employer would moreover go into court with prejudice against him. This also applies to the employee who should elect not to come under the law, the advantage being in either case with the party coming under its provisions. However, if both employee and employer reject the law it automatically places both parties under it.

Speaking of the insurance feature, Mr. Wrightman stated that all of the existing insurance companies must necessarily raise their rates for insurance under the new compensation law. The rates of New Jersey are taken as a standard and as these are at present three times higher than the rates existing in Iowa, it is safe to assume that the rates which will be made for insurance in Iowa after July 1 will be from 5 to 10 per cent higher than the present New Jersey rates. Mr. Wrightman said that anticipating this situation, the Manufacturers' Association of Iowa has formed an insurance company to handle the liability insurance of its members and the electrical associations of the state were invited to participate. He said that the Association by the elimination of the overhead charges of the reserve companies can make rates at least 50 per cent lower than those which will be given by these companies. All money left over at the end of the year will either be returned pro rata or applied on the premiums for the following year. The fund, however, will be reinsured in an established company so that there will be no possible chance of an assessment in case the fund created by the policies is exhausted by reason of unusual accidents.

At the session on Thursday morning, the first business taken up was a paper by W. A. Ross entitled "A Few Features of the Operations of the New Development at Keokuk." In the absence of the author, this paper was read by A. D. Ayers. This paper comments on the features of the noteworthy Keokuk development and enumerates some of the difficulties that were encountered in construction. The most important of the latter was the variation in flow of the river at the point selected for the development, this variation being from 20,000 to 300,000 second-feet. The electrical equipment of the generating station was described, and important features of the transmission lines and substations commented on. It was pointed out that the load-factor of the station at the present time is 63 per cent. The kilowatt-hour output in December last year was 923,000. It was also pointed out that the loss in voltage between the generating station at Keokuk and the substation at St. Louis amounted to 12 per cent.

Following this, a paper entitled "Conduct of Public Utilities under Commission Supervision" was presented by F. W. Stearns, of Chicago. Mr. Stearns reviewed briefly the history of commission regulation, commenting on the policies of the utility companies which in a measure were responsible for the growing demand for supervision of some kind. Massachusetts, New York and Wisconsin were the first states to provide for state regulation of public utilities, and since the establishment of these commissions, 26 states have follower their example.

Mr. Stearns strongly advocated the central control of utilities by state commissions rather than home rule which is so uniformly advocated by many of the large cities. He stated that while some public service companies were at first doubtful as to the results of regulation, at present there is hardly a company in any of the states having commissions that would favor the return to municipal regulation. Mr. Stearns stated that while the commissions at present are not entirely free from politics, as the commissioners are in every case appointed, still the commissioners by devoting their entire time to the study of utility problems become much better qualified to handle the work than city councils who are, of course, unfamiliar with the problems which they are trying to solve. It is also true that the state commissions usually surround themselves with competent engineers who are in a position to handle their work on a scientific basis.

One of the good features of utility regulation in most states is that electrical securities now have to be approved by the public service commission, and this puts the securities on an investing rather than a speculative basis.

Mr. Stearns referred to several of the decisions made by public service commissions in rate and franchise cases and stated that where the utility meets the commission in a spirit of fairness, fair treatment is usually given. However, many of the state public service laws are lacking and unnecessarily curtail the powers of the commissions to protect the utility companies. A case in Stockton, Cal., and in Oregon, Wash., were cited in this connection, in both instances franchises being issued to municipal plants although no complaint could be found with the service and rates of the existing privately owned companies. In both of these states the commissioners criticized the law which prevented them from withholding franchises from these municipalities.

Prof. A. H. Ford opened the discussion inquiring of Mr. Stearns whether a company could earn an amount greater than the rate specified by the commission if such excess was due to economies in management. Mr. Stearns replied that in most states the commissions make reasonable provision for economies in management. Prof. Ford added that it would seem advisable to introduce into the law a section making reduction of rates impossible until a certain specified rate of return is exceeded. This would allow a company to effect economies by efficient management and profit thereby, whereas under existing laws the savings effected by good management are penalized.

William D. McJunkin, Chicago, then delivered an address on "Co-operative Advertising." Mr. McJunkin first called attention to the value of advertising by public utility companies and to the economies that could be effected by co-operative advertising. He outlined in some detail the plans of the McJunkin Agency for furnishing advertising copy, news items, hand bills, bill stuffers, etc., on a co-operative basis.

He also referred to a scheme adopted by the Commonwealth Edison Company for illuminating local billboards on a co-operative basis. The annual revenues of the company from this business have now reached the figure of $60,000. Samples of advertising of various kinds furnished under the co-operative plan mentioned were exhibited.

The report of the Committee on Facts and Factors of which Austin Burt, of Waterloo, is chairman, was then presented. This report, as has

Facts and Factors of Iowa Central Stations.

STATION NUMBER	Population of District	No. Consumers per 100 Population	Station Rating, Kw	Station Rating per Capita, Watts	Station Rating per Employee, Kw	Ratio Station Rating to Con'cted Load, per Cent	Average Load During Operation, Kw	Ratio o Av. Load to Station Rating, per Cent	Annual Load Factor, per Cent	Operating Load Factor, per Cent	Investment per Kilowatt of Rating	Investment per Capita	Gross Income per Kilowatt of Rating	Gross Income per Consumer	Gross Income per Capita	Gross Income per $100 Invested	Gross Income per Kw-hr. Made, Cents	Ratio Expense to Gross Income, per Cent	Net Earnings, per $100 invested, Interest and Depreciation not Deducted.	Total Hours of Operation per Year
Item No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	700	12.8	75	107	37	93	10.0	13.3	34.2	50.0	$200	$21.43	$58.70	$48.90	$ 6.29	$29.30	7.3	127.1	$ 8.00	6,000
2	750	16.0	75	100	25	250	4.4	5.9	10.5	26.0	173	17.33	38.54	24 08	3.85	22.22	18.5	68.5	.00	3,540
3	1,050	7.9	17	16	17	62	.....	....	....	....	400	6.67	167.30	34.30	2.71	40.65	....	77.4	9.15	2,500
4	1,100	19.4	75	68	25	...	.....	....	....	....	160	10.90	80.00	28.00	5.46	50.00	....	66.7	16.67	8,760
5	1,200	14.6	50	42	25	91	10.0	20.0	16.5	22.2	240	10.00	112.20	32.05	4.67	46.75	8.6	85.5	6.75	6,500
6	1,200	16.6	75	62	25	37	13.8	18.4	17.3	27.6	224	14.00	100.00	37.50	6.25	44.35	9.9	70.0	13.40	5,500
7	1,200	14.2	90	75	90	...	3.5	3.9	....	....	164	12.30	35.70	18.88	2.67	21.75	10.5	69.8	6.57	8,760
8	1,200	14.6	50	43	25	28	13.0	26.0	15.0	30.0	400	16.67	154.00	44.00	6.42	38.50	13.9	89.6	4.05	4,380
9	1,400	21.4	125	89	42	48	15.0	12.0	23.9	25.0	120	10.72	.....	.....	.....	.....	....	.....	.....	8,360
10	1,400	7.0	40	29	40	100	11.0	27.5	8.7	30.0	262	7.50	67.60	27.57	1.93	25.75	9.6	55.5	11.50	2,550
11	1,500	13.3	60	40	20	48	25.0	41.7	15.7	50.0	167	6.80	124.20	37.25	4.97	73.05	10.8	84.0	11.66	2,750
12	1,500	25.0	125	83	25	...	.....	....	....	....	200	16.67	104.60	34.90	8.72	52.30	....	84.5	8.08	8,760
13	1,600	20.3	110	69	29	21	72.9	66.0	66.0	75.0	243	16.25	149.10	49.10	9.97	61.40	2.8	46.6	32.75	7,710
14	1,600	16.6	200	125	50	67	14.3	7.1	14.4	17.7	125	15.62	53.70	40.70	6.71	42.95	10.5	74.5	10.92	7,120
15	1,600	20.0	100	62	33	42	10.3	10.3	12.1	12.1	370	23.10	80.00	25.90	5.00	21.62	8.9	.....	.....	8,760
16	1,700	12.2	175	103	58	70	22.6	12.9	16.9	39.3	131	13.51	47.50	39.95	4.89	36.10	9.8	76.5	8.48	3,760
17	2,000	10.3	90	45	30	60	25.8	28.7	12.2	36.8	178	8.00	99.40	43.40	4.47	55.90	11.9	64.0	20.10	2,900
Average 1914.	1,337	15.4	90	68	35	73	18.0	21.0	20.2	34.0	221	13.40	92.00	35.35	5.31	41.40	10.2	76.0	10.61	5,800
Average 1913.	1,416	14.2	88	61	28	56	20.2	26.6	....	30.2	216	10.93	93.28	31.96	5.43	51.51	11.6	66.6	20.51	4,871
Average 1911.	1,415	11.9	82	62	36	94	19.4	26.3	....	33.8	205	11.03	84.30	48.20	4.33	43.50	10.9	73.4	8.23	4,840
Average 1909.	1,600	10.0	67	42	27	94	.....	....	....	36.0	236	10.00	94.00	37.00	4.06	38.00	....	70.0	.....	.....
18	2,200	15.9	140	64	47	42	16.9	12.0	21.9	23.2	171	10.85	92.50	37.00	5.89	54.20	9.2	55.4	24.15	8,260
19	2,400	12.1	130	54	26	26	20.0	15.4	20.9	22.2	215	11.66	76.90	34.50	4.17	35.70	6.1	80.0	7.14	8,260
20	2,500	22.9	160	64	26	23	56.6	35.3	37.7	37.7	237	15.20	127.90	35.75	8.20	53.90	4.1	72.2	15.00	8,760
21	2,900	15.7	190	65	38	26	14.9	7.8	15.0	15.0	225	14.74	62.40	26.00	4.09	27.70	9.1	63.7	10.05	8,760
22	3,000	20.0	100	33	25	33	37.0	37.0	34.9	35.0	250	8.33	166.67	27.80	5.55	66.67	5.2	72.0	18.65	8,740
23	3,000	16.6	210	70	35	47	26.3	12.5	27.6	27.7	166	11.63	66.40	27.90	4.65	40.00	6.1	89.2	4.30	8,740
Average 1914.	2,667	17.2	155	58	33	33	28.6	20.0	26.4	26.8	211	12.07	98.80	31.50	5.42	46.40	6.6	72.1	13.21	8,600
Average 1913.	2.437	16.6	163	67	36	43	27.1	16.7	....	27.4	201	12.88	105.40	41.53	6.76	58.10	8.0	75.6	18.46	8,573
Average 1911.	2,650	12.7	157	60	29	55	28.4	25.1	....	33.0	190	10.61	83.20	37.40	4.52	41.90	5.7	76.1	10.39	7,620
Average 1909.	2,470	10.0	122	44	38	48	.....	....	....	....	221	9.40	95.00	43.00	4.04	41.00	....	63.0	.....	.....
24	3,500	12.8	300	86	60	50	53.7	17.9	27.1	29.0	150	12.85	68.60	45.70	5.88	45.70	4.7	67.8	14.71	8,200
25	3,850	13.1	400	104	44	...	.....	....	....	....	237	24.60	47.90	38.00	4.98	20.20	....	88.8	3.73	8,760
26	4,200	17.3	285	68	28	35	....	....	....	....	141	9.60	82.30	32.30	5.58	58.20	....	58.9	23.88	8,200
27	5,000	10.8	270	54	30	30	57.0	21.1	19.0	19.0	333	18.00	119.00	59.60	6.43	35.73	6.4	58.9	14.70	8,760
28	5,000	13.2	190	38	31	40	28.6	15.0	25.9	25.9	263	10.00	113.40	32.70	4.31	43.10	8.6	74.2	11.10	8,760
29	5,200	19.0	1040	200	62	50	152.0	14.6	38.0	38.0	120	24.00	52.40	55.00	10.47	43.60	4.1	68.7	13.60	8,760
30	6,000	10.1	380	63	47	50	22.2	5.8	14.8	14.8	158	10.00	50.40	31.50	3.19	31.90	9.9	79.2	6.62	8,760
31	7,000	18.9	300	43	33	43	78.0	26.0	20.8	20.8	300	12.85	136.30	31.00	5.84	45.45	6.0	50.9	22.32	8,760
32	7,000	14.7	875	125	125	62	30.8	3.5	13.7	13.7	343	42.85	27.45	23.43	3.43	8.00	8.9	41.1	4.71	8,760
33	8,000	12.0	590	74	37	39	68.5	11.6	24.8	24.8	495	36.60	112.00	68.80	8.28	22.60	11.0	68.0	7.24	8,760
Average 1914.	5,475	14.2	463	86	50	44	61.4	14.4	23.0	23.3	254	20.14	80.97	41.80	5.84	35.45	7.5	65.7	12.12	8,648
Average 1913.	4,550	12.9	277	61	33	66	36.7	21.4	....	33.0	222	12.67	116.16	52.78	7.06	61.76	7.7	63.4	27.81	7,379
Average 1911.	4,580	11.5	239	53	33	74	42.1	18.0	....	26.7	248	12.30	88.50	38.75	4.46	38.25	6.8	67.1	13.95	7,720
Average 1909.	5,670	10.0	285	51	37	50	.....	....	....	....	202	10.00	85.00	42.00	4.40	49.00	....	56.0	.....	.....
34	10,000	13.4	725	72	20	51	117.0	16.1	25.0	25.0	388	28.10	75.70	40.85	5.49	19.53	5.4	65.5	6.73	8,760
35	10,750	14.3	1100	103	27	77	143.2	13.0	29.0	29.0	454	46.52	55.45	39.60	5.67	12.20	4.9	62.0	4.63	8,760
36	11,000	13.6	2000	182	74	133	228.0	11.4	45.6	45.6	342	62.20	35.67	47.50	6.48	10.42	3.6	52.8	4.91	8,760
37	12,000	10.4	950	79	47	95	113.0	11.9	26.9	26.9	....	.....	.....	.....	....	.....	....	.....	.....	8,760
38	17,000	11.8	850	50	61	40	202.3	23.8	30.0	30.0	470	23.40	113.70	48.35	5.70	24.30	5.4	49.0	12.40	8,760
Average 1914.	12,150	12.7	1125	97	46	79	160.7	15.2	31.3	31.3	414	40.10	70.10	44.10	5.84	16.60	4.8	57.3	7.17	8,760
Average 1913.	17,060	7.2	1080	63	119	56	215.0	20.0	....	29.7	579	27.47	82.55	64.07	4.27	60.55	4.9	50.3	18.13	8,760
Average 1911.	14,500	8.4	1206	92	128	70	141.0	14.1	....	22.6	277	18.70	65.70	52.95	4.27	24.10	5.5	54.7	12.71	8,760
Average 1909.	15,500	5.0	775	50	71	67	.....	....	....	22.0	139	8.00	60.00	60.00	3.20	54.00	....	71.0	.....	.....
39	25,000	9.7	1000	40	32	23	323.8	32.4	32.4	32.4	310	12.40	128.60	53.20	5.15	41.50	4.5	44.1	23.20	8,760
40	26,000	7.7	3000	115	176	27	582.0	19.4	35.9	35.9	177	20.38	67.95	102.40	7.84	38.45	4.0	55.0	17.30	8,760
41	30,000	13.3	2700	90	77	44	380.0	14.1	31.6	31.6	....	.....	.....	.....	.....	.....	....	.....	.....	8,760
42	38,000	12.2	4225	112	78	47	667.0	15.8	29.0	29.0	286	31.80	56.60	51.50	6.29	19.70	4.1	51.4	9.60	8,760
43	45,000	6.6	5000	111	111	90	862.0	17.2	30.0	30.0	195	21.70	42.65	72.30	4.74	21.80	2.8	41.2	12.84	8,760
44	117,000	7.6	8850	76	49	51	1675.0	18.9	35.0	35.0	339	25.60	66.50	66.70	5.03	19.62	4.0	.....	.....	8,760
Average 1914.	46,830	9.5	4130	91	87	47	748.3	19.6	32.3	32.3	261	22.40	72.50	69.20	5.80	28.20	3.9	47.9	15.73	8,760
Average 1913.	44,500	7.5	3120	64	209	56	593.0	24.4	....	24.3	326	19.91	81.35	71.10	4.52	28.22	4.1	50.6	15.03	8,760
Average 1911.	55,600	6.2	2890	51	81	43	653.0	22.7	....	31.5	541	27.20	80.50	68.90	4.17	15.27	4.1	48.9	10.26	8,750
Average 1909	53,000	5.0	2110	46	262	42	.....	....	....	24.0	195	9.00	88.00	79.00	3.50	42.00	....	51.0	.....	.....
Grand Av. 1914	9,890	14.3	852	77	46	57	159.2	18.5	25.2	30.0	251	18.40	85.80	41.35	5.57	36.70	7.6	67.9	11.57	7,565
Grand Av. 1913	11,400	12.5	778	61	71	35	155.0	23.2	....	29.3	255	14.23	93.50	49.90	5.74	50.60	8.2	63.6	21.00	6,950
Grand Av. 1911	14,920	10.6	576	64	51	72	117.0	22.0	....	30.1	252	13.85	82.10	47.60	4.36	36.80	7.8	67.5	11.82	6,710
Grand Av. 1909	9,411	9.0	401	44	63	56	.....	....	....	32.0	220	9.60	89.50	46.00	3.93	41.60	....	64.0	.....	.....

been the custom for several years, gives detailed statistics on a large number of Iowa central stations, the material this year being compiled by the engineering experiment station of the University of Iowa, under the direction of F. A. Fish. The report is presented herewith.

At the session on Friday morning, E. W. Lloyd, contract agent of the Commonwealth Edison Company, Chicago, delivered an address entitled "The Object and Results of Affiliation." As vice-president of the National Electric Light Association, Mr. Lloyd called attention to the vast amount of data that the Association is collecting for the use of its members, particularly the Commercial Section, which is completing a revision of the Commercial Section Digest. Mr. Lloyd called particular attention to the educational work which the Association is carrying on and to the activities of the various committees. Reference was also made to the street-lighting statistics which are being compiled and to the preparation of a schedule of the principles of rate making. Mr. Lloyd stated that uniform rates were just as vital as uniform accounting to the central-station industry.

Following this address, J. E. Latta, of the Underwriters' Laboratories, Chicago, presented a paper entitled "Rubber-Covered Wire." Mr. Latta stated that up to 1911 a weakness of the National Electrical Code rules was the lack of requirements for sufficiently exacting factory and laboratory tests for a reliable determination of the real properties of the rubber compounds employed in rubber-covered wires. No chemical test at all was called for and the way was left open for the use of compounds which might be woefully lacking in the permanent properties of high-grade rubber, although such compounds might show up splendidly when the code tests were run on the new wire. But two tests were called for, namely, tests for insulation resistance expressed in megohms per mile and the test for dielectric strength. Since 1911 the rules have called for careful electrical tests on rubber-covered wire and for thorough physical and chemical tests of the rubber covering. The new-code wire is inspected at the factories by representatives of the Underwriters' Laboratories, and found to conform with the requirements of the latest edition of the National Electrical Code.

Mr. Latta strongly urged the use of new-code wire by central stations and contractors of the state and asked for their co-operation in discouraging the use of old-code wire. He said that it was significant that in no case would an engineer, architect or contractor permit the use of old-code wire in an expensive building where the cost of wire is a large item, but in residences and small installations where the additional cost of new-code wire over old-wire is negligible, numerous instances of the use of the poorer material are found. Mr. Latta predicted that unless the use of old-code wire could be stopped by mild means very soon, drastic treatment on the part of inspection bureaus would become necessary.

Following Mr. Latta's paper, W. H. Thomson, of Des Moines, made a motion to the effect that the Association encourage the use of new-code wire and in every case discourage the installation of old-code wire.

A. L. Fowler, a contractor of Cedar Rapids, stated that the Iowa Contractors' Association had passed a resolution to discourage the use of old-code wire and this Association would be more than willing to co-operate with the central-station organizations in this matter.

A paper entitled "Is There a Saturation Point in the Sale of Electricity?" was then presented by J. S. Forbes, of Cedar Rapids. This paper, which is presented in full in another part of this issue, urges central-station companies to maintain a new-business department even if this department must necessarily be limited to one man. Details of a house-wiring campaign carried on at Marshalltown, Iowa, are presented and some of the various schemes adopted by the Cedar Rapids Company for securing different classes of business, are described.

Rufus E. Lee,
President-elect, Iowa State Section, National Electric Light Association.

Following this paper, the convention went into executive session, at which the report of the Nominating Committee was presented. The following were elected to office for the ensuing year:

President, Rufus E. Lee, Clarinda.

Vice-president, A. D. Ayers, Keokuk.

Secretary, W. H. Thomson, Jr., Des Moines.

Treasurer, W. A. Mall, Belle Plaine.

The new Executive Committee is composed of A. L. Dodd, H. B. Maynard, H. C. Blackwell and M. A. Harrison. Keokuk was decided upon for the place of the next annual meeting.

The entertainment features of the convention included the annual banquet on Wednesday night at which the manufacturers and supply men were the hosts, and a theater party on Thursday night given by the Cedar Rapids and Marion Street Railway Company, and the Iowa Railway & Light Company. Following this, a rejuvenation of the Jovian Order was held at which 27 candidates were initiated. Charles Young, of the Iowa Railway & Light Company, statesman for Iowa, conducted the rejuvenation, and J. B. Terry was in charge of the degree team. On Thursday afternoon a special car carried the delegates to Iowa City, where an inspection trip of the laboratories and buildings of the state university was made. Prof. Ford presented a paper on "High Tension Lightning Protection," demonstrating the various types of lightning arresters at present on the market. He conducted numerous demonstrations showing the principle involved in arcing rings for insulators, and pointed out that insulators should be purchased which would flash over at 50 per cent below puncture voltage.

Lightning Protection.

Lightning troubles on high-tension lines have their origin in differences in potential that exists between charged rain-clouds and the earth. The danger to lines is in the sudden collapsing of the charges. The clouds held a large charge on the transmission lines due to induction. When the flash takes place this large charge travels along the transmission line seeking a path to earth, and usually manages to "spill over" through a weak insulator on a pole, or through a poorly insulated spot in a transformer. The only means for securing perfect protection for a transmission line is to completely surround it with a tube of such low resistance and carrying capacity that no inductive effects or direct stroke can reach the conductor itself. This is, of course, impracticable, but an approximation to this condition can be had by stringing several conductors above and at the sides of the line and grounding them at frequent intervals. Such protection has been found to be commercially practicable only to the extent of stringing one or two wires above the transmission line itself. Such overhead ground wires should have ample carrying capacity, and should be grounded at intervals not greater than 1,000 feet. Commercial types of lightning arresters are now on the market which will protect the apparatus connected to them from the inductive effects of lightning, but so far no device has been put forth which will protect from a direct stroke without itself being destroyed. Trouble is experienced in operating a simple spark gap on a transmission line as a lightning arrester, due to the normal tension on the line maintaining an arc after it is once started by the lightning stroke. Some form of current interrupter is therefore necessary. Magnetic blow-outs or self-restoring circuit-breakers are sometimes used in the case of direct currents. Simpler methods will break up an alternating-current arc. The most common one is to make the arrester of metal the vapor of which is a non-conductor, as zinc or brass, and make it of sufficient size to cool the vapor path quickly. Another common form is the horn gap, which is so made that the heat of the arc starts an upward cur-

rent of air which breaks up the discharge. Both the horn-gap and the magnetic blow-out have objections. The simple gap of non-arcing metal is admirably adapted for the protection of secondary circuits of distribution transformers, where the potential is not over 300 volts. When arresters are operating on voltages of over 1,100 volts it is necessary that considerable resistance be put in series with the spark gap so as to limit the current to such value that the cooling effect of the arrester will put the arc. When the voltage is increased it is necessary to put more gaps in series to still keep the current within a reasonable value. Such an arrangement has been used up to 66,000 volts. Series resistance selection for this type of arrester is very important. If the resistance chosen is too low the power current which follows the discharge is so great as to trip the circuit-breakers in the powerhouse, while if too high the effectiveness of the arrester is hindered. Increasing the number of gaps in series so as to increase the ability to suppress the power arc has the effect of making the arrester discharge less freely, so that arresters of this type are not very satisfactory for use above 5,500 volts. The compression gap arrester was next discussed and mention made of the peculiar effectiveness of this type when operating several in series. The shunted-gap arrester next was taken, and its approximation to the ideal pointed out. The desirable arrester was said to consist of an arrangement which will allow a spark to pass when the voltage is slightly above the line voltage, but which will allow only enough current to flow to discharge the line. This the shunted-gap arrester accomplishes by bridging a high resistance around part of the gap. The aluminum-cell arrester consists of a number of electrolytic cells made of aluminum treated with sodium hydroxide and placed in an electrolyte of permanganate of potash, connected in series between the line and ground. This cell allows only a very small current to flow until the voltage exceeds a certain predetermined value. Arresters of this kind are connected to the line through a horn spark-gap which is set to discharge at a pressure just above the working voltage. The hydroxide film is dissolved in time, even at oridnary room temperatures, so that it is necessary to connect the arrester directly to the line at frequent intervals—preferably daily—in order to charge it. The first rush of current during charging is very large unless it is reduced by means of a series resistance; so it is customary to have the charging contacts connected to the line through resistances.

The speaker advocated the following plan. Use insulators so proportioned that the puncture voltage is much greater than the arc-over voltage when the insulator is dry, so that an insulator will always fail by arcing over. Install an arcing ring or its equivalent at each insulator. If a guard ring were not provided the discharge takes place as a puncture. When a line is equipped in this way the lightning arresters will relieve the ordinary discharge without interruption to the service and the arcing rings will prevent damage to the insulators when the discharge approximates that of a direct stroke.

In conclusion the following points were made. Low-voltage circuits (not over 300 volts) from a distributing transformer should be protected by placing a single spark-gap arrester every 500 feet. Primary distribution circuits, up to 4,000 volts, should have an arrester of the series gap or compression type at each transformer for its protection—unless the transformers are less than 1,000 feet apart. An arrester of the shunted-gap type with choke coils should be installed at the entrance to the power station. Transmission lines operating between 4,400 and 33,000 volts should have either aluminum-cell or shunted-gap arresters with choke coils at the generating station and at the important substations. In the substations of secondary importance horn-gap of compression-type arresters with choke coils should be used. A similar arrangement, without the choke coils, should be installed every five miles along the line. The arresters at other points than where transformers are connected are for the purpose of protecting the insulators. Lines operating higher than 33,000 volts should have aluminum-cell arresters with choke coils installed at the generating station and at each substation and horn-gap arresters each five miles along the line. The common practice of using the same pipe which serves as a ground for the low-valtage windings of a transformer for the grounding of the high-tension side was not recommended, because of the liability of the small leakage current drying out the earth in the neighborhood of the pipe.

Iowa Street and Interurban Railway Association.

The eleventh annual convention of the Iowa Street and Interurban Railway Association was held at the Montrose Hotel, Cedar Rapids, Iowa, April 23 and 24, one session, that on Thursday afternoon, being held jointly with the Iowa Section N. E. L. A. which met at Cedar Rapids on the same days. The morning session was opened by President C. D. Cass, of Waterloo, and the reports of the various committees presented. Papers were presented by M. A. Welsh, Jr., of Waterloo, entitled "Some Results Obtained from the Safety First Campaign" and T. A. Wood, of Council Bluffs, entitled, "Shop Practice."

On Thursday afternoon the railway delegates joined with those of the Iowa Section N. E. L. A. in the inspection trip to the University of Iowa.

On Friday morning a paper was presented by M. M. Lloyd, of Des Moines, entitled "Car Cleaning and Sanitation," and P. T. Crafts, entitled "Modern Public Policies of Public Service Corporations."

At the executive session, which was also held on Friday morning, the following officers were elected:

C. A. Sluessler, Council Bluffs, president.

J. D. Porter, Davenport, vice-president.

H. E. Weeks, Davenport, secretary-treasurer.

This association also agreed to meet in Keokuk next year.

Semi-Annual Convention of Iowa Electrical Contractors' Association.

The second semi-annual convention of the Iowa Electrical Contractors' Association was held at Cedar Rapids, Iowa, April 22 and 23, two of the sessions being parallel sessions with the State Section of the National Electric Light Association convention, which was held at the same time.

The first session was called to order by M. A. McCarten, Marshalltown, president, who welcomed the delegates to the meeting and spoke of the value of the organization to the contractors of the state. Although the association has been in existence only since February of this year, the growth has been exceedingly satisfactory.

A paper entitled "Modern Business Methods in Reference to Electrical Contracting," was then presented by Ed Kunkel, of Davenport. This paper is published in full elsewhere in this issue.

Charles Brown, of Chicago, presented a motion that the paper be printed by the association, which motion was unanimously carried.

J. W. Perry, of Ames, called attention of the delegates to the engineering and extension work recently undertaken by the Iowa State College of Agriculture and Mechanical Arts. He assured the contractors that it was the aim of the college to be of the greatest possible usefulness to the men engaged in practical electrical work, and to this end the college has recently inaugurated practical courses and also correspondence courses for those not able to attend personally.

George O. May, of Sioux City, called attention to the need of closer co-operation of electrical contractors in Iowa. He spoke of the possibilities if such co-operation were made feasible through the work of the Iowa Association.

J. E. Latta, of Chicago, spoke briefly of rubber-covered wire, pointing out that until 1911 the test required in the National Electrical Code on wire was not sufficiently comprehensive to ascertain whether the insulating compounds were of a proper kind. It happened frequently that the rubber used, which showed up favorably under these tests when wire was new, soon became worthless when the conductors were put in service. The present Code rules, he said, call for much more exacting tests, which insures the wire having the necessary insulating properties which will be retained in service. The additional cost of the new code wire is negligible when compared with its advantages. Mr. Latta appealed to the contractors to take measures to

discourage the use of all old-code wire in Iowa.

Messrs. Kunkel and May both made brief talks in which they endorsed the request of Mr. Latta that the use of old-code wire be discontinued in the state.

The afternoon session was held jointly with the Iowa State Section of the National Electric Light Association, and the report of this meeting will be found elsewhere in this issue.

Thursday morning was taken up largely with a further discussion of liability insurance, George A. Wrightman, of Des Moines, adding to his remarks made at the morning session. A paper by Floyd A. Wallace, of Des Moines, entitled "Uniform Plans and Specifications" was then presented by the author. This paper is printed in full in another section of this issue.

W. J. Ball, of Moline, then presented a paper entitled "System of Bookkeeping for Electrical Contractors." This system was fully described and illustrated in our issue of July 12, 1913.

An afternoon session was held at which E. J. Burns, of the Illinois Contractors' Association, described in detail the plan of the Illinois Association for obtaining liability insurance from one of the Eastern reserve companies through co-operative measures. He cordially invited the Iowa Association to take advantage of the rates obtained by the Illinois Association, which invitation was unamiously accepted. The remainder of the afternoon was devoted to an executive session.

Standards Committee Expediting Work.

The Standards Committee of the American Institute of Electrical Engineers, which is revising the Standardization Rules of that organization, expects to so far complete its work as to present a draft of the new rules to the Board of Directors before the annual convention to be held in Detroit in the latter part of June. The committee held a two-day session in New York City, on April 21 and 22, at which the reports of the subcommittees were revised and approved. It was decided to print a few hundred copies of this draft, which will be available to any member of the Institute who desires to secure a copy in order to offer constructive criticism to the committee before the rules are finally adopted.

After final revision and adoption a copy of the Standardization Rules in their final form will be available to the entire membership of the Institute and may be secured by others upon payment of a stipulated sum. The new rules will differ greatly from the old ones.

JOINT MEETING OF AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS AND AMERICAN PHYSICAL SOCIETY.

Meeting and Exhibit of Physical Apparatus at Bureau of Standards, Washington.

A joint meeting of the American Physical Society and the American Institute of Electrical Engineers was held on April 24 and 25 at the Bureau of Standards, Washington, D. C. The new electrical building of the Bureau of Standards was opened for inspection and the sessions were held in the lecture room on the top floor of this building. A description of this laboratory will be found in our last issue. In connection with the meeting there was an exhibit of physical apparatus by various laboratories, manufacturers, dealers and others.

Sessions were held on Friday morning, Saturday morning and Saturday afternoon by the American Physical Society, with President Ernest Merritt in the chair. On Friday afternoon there was an address by Sir Ernest Rutherford on "X-Ray and Gamma-Ray Spectra." On Friday evening the session was conducted under the auspices of the Electrophysics Committee of the American Institute of Electrical Engineers, with Chairman J. B. Whitehead in the chair. Following this session there was a luncheon and smoker, arranged by the Washington and Baltimore Sections of the Institute. On both days of the meeting the members and visitors were the guests of the technical staff of the Bureau of Standards at luncheon. The attendance of members of the Physical Society was greater than at any previous meeting of that Society.

There were in all about 40 papers presented by members of the American Physical Society in the form of abstracts. A number of these were upon electrical subjects, of which the following may be mentioned: "New Methods for Measuring Time-Constants of Low Resistances," by F. Wenner, E. Weibel and F. B. Silsbee; "A Sensitive Moving-Coil Galvanometer," by F. Wenner, E. Weibel and F. C. Weaver; "Surface Leakage Over Insulators," by H. L. Curtis; "Corona Produced by Continuous Potentials," by S. P. Farwell; "An Electromagnetic Puzzle," by F. J. Rogers; "The Testing of Potentiometers," by Frank Wenner and E. Weibel; "Some Records of Wireless Time Signals Made with a Physiological Recorder," by C. W. Waggoner; "Electric Conduction and Thermoelectric Action in Metals," by E. H. Hall; "Electrochemical Indicators and Recorders. Instruments for Showing Continuously the Chemical Content of Solution," by F. A. Harvey; "Characteristic Curves of Tungsten-Filament Incandescent Lamps and Their Application in Heterochromatic Precision Photometry," by G. W. Middlekauff and J. F. Skogland; "The Thomson Effect and the Thermal Conductivity of Tungsten at Incandescent Temperatures," by A. G. Worthing.

At the Friday evening session there were three papers presented under the auspices of the American Institute of Electrical Engineers, preceded by an address by President C. O. Mailloux. The first paper was by C. R. Underhill and was entitled "Solenoids."

Solenoids.

Maxwell's law for the attraction between the halves of a bar electromagnet is not correct for electromagnets of the plunger type with air gaps between the cores because the flux in the cores is, to a large extent, independent of the reluctance in the air gap on account of the magnetic leakage from the inner end of either core back to the other end of the same core. In this paper, only the characteristics of direct-current electromagnets are discussed. An attempt is made to show the correct law of attraction for tractive electromagnets and to calculate the value of the magnetizing force at any point along the axis of any solenoid. Test characteristics are given to support the theories. The work done by an electromagnet of the plunger type in closing its air gap is largely proportional to the length of the air gap, although, when the reluctance of the air gap and the total magnetomotive force are of low value, the law of Carichoff is approximately correct for the total attraction.

This paper was discussed by C. W. Burrows and E. R. Carichoff. Dr. Burrows took exception to the numerical values given in Mr. Underhill's tables, many of which he claimed contained large errors. Mr. Carichoff presented in writing a demonstration that the maximum work may be obtained from a plunger electromagnet when the reluctance of the air gap is equal to that of the ferromagnetic material.

The next paper was entitled "Some Investigations of Lightning Protection for Buildings," by L. A. DeBlois.

Lightning Protection for Buildings.

A description was given of investigations conducted for a large manufacturer of explosives to determine upon a suitable system of lightning protection for buildings containing explosives. The work was divided into the following sections: (1) An analysis by oscillograph of the secondary currents induced by actual lightning discharges in vertical earthed conductors, the results seeming to indicate that such currents are non-oscillatory though occuring in either a negative or positive direction. An attempt is made to explain the phenomena generally attributed to high-frequency oscillations by the existance of undirectional waves of almost vertical front. (2) An investigation of the primary effects of a 20-inch spark in air having the same essential characteristics as those attributed to lightning when applied to a model protective system consisting of isolated vertical conductors sur-

rounding a small building. (3) An investigation of the secondary effects produced under the above conditions, which are considered to be static inductive rather than dynamic inductive. A brief description was given of a general protective system recommended for explosives

The discussion of this paper was opened by E. E. F. Creighton, who emphasized the value of the paper and suggested that the subject of protection from lightning would be a good one for the Bureau of Standards to take up. Regarding the frequency of lightning discharges, no evidence can be obtained from the oscillograph, since the latter does not respond to a high frequency, but can only show a summation of the collective discharges in an oscillation. Lightning arresters which are sensitive to high frequency and not to impulses often respond, showing that a high frequency must be present in many discharges.

G. R. Olshausen referred to the work of Walter, showing a number of separate parts of lightning stroke—predischarge, a complete flash, a rest period during which leakage takes place, and then a series of discharges, with a final discharge after an interval. He stated that there was experimental evidence of both oscillatory and unidirectional discharges. He showed some lantern slides which indicated a predischarge, a single discharge and an oscillatory discharge.

A. G. Webster stated that the evidence regarding the oscillatory nature of the discharge was rather uncertain. Hot upward currents of air appear to attract a discharge. An initial discharge ionizes the air and provides an easy path for successive discharges.

Elihu Thomson stated that there may sometimes be oscillatory discharges, but they are more often unidirectional. This is indicated by the clicking produced in a telegraph relay, which would not be affected by a high-frequency discharge. Studies of the lightning problem often result in incorrect conclusions on account of considering a cloud as a charged conductor. This is not correct, since the cloud has the same consistency as a fog and there is no continuous conducting path through it. After a discharge has begun, the differences in potential are sufficient to cause charges to pass from point to point in the cloud, and these breakdowns serve to feed the main discharge with electricity. There is a flow of energy toward the point of discharge from all clouds in that neighborhood, and this flow is not compatible with an oscillatory discharge. The reason barns are so frequently struck by lightning is because they are well grounded, due to the moisture and ammonia salts which are usually present. Even where lightning rods are provided for barns, the ground may be better inside the building than for the rod outside, and hence they may still be struck. He considered Oliver Lodge wrong in deciding that an iron rod is better than a copper one.

W. J. Humphreys pointed out that the branching frequently observed in lightning discharges is always downwards and never upwards, indicating a unidirectional discharge.

L. T Robinson stated that the oscillograph could be arranged for frequencies as high as 50,000 cycles per second, but that the photographic films were not sensitive enough to obtain the records with the short exposure which would be necessary

Burton McCollum told of an instance where the series field of a generator had been reversed by a lightning discharge, which was good evidence that it was not oscillatory in character.

The last paper to be presented at this session was one by W. S. Franklin, entitled "Some Simple Examples of Transmission-Line Surges." In the absence of the author this was presented in abstract by Burton McCollum.

Transmission-Line Surges.

This paper treated the wave phenomena which take place on a transmission line when switches are opened and closed. These phenomena are practically the same in alternating and direct-current systems for transmission lines up to 150 or 200 miles in length, and therefore the surges which are described in the paper are the surges which take place when a steady voltage is connected to the line or when the line is disconnected with a steady current flowing in it. Line resistance and leakage are assumed to be zero. The details of line surging which takes place under such conditions are most easily described in terms of what may be called the "ribbon wave." A number of practical examples are described

In discussing this paper, J. M. Weed pointed out that the conditions assumed did not correspond to actual transmission lines where there is distributing capacity, inductance and leakage. The method of study was, however, a valuable one and could be modified so as to include considerations. In practice, wave fronts are sometimes found to be so steep as to cause damage, even where apparatus has been designed to provide for this condition.

A. G. Webster told of some experiments along this line which he had made.

Trygve D. Yensen presented written discussion describing some work done in association with Professor Berg, at the University of Illinois. Laboratory experiments which were there carried out indicated a undirectional discharge. Experiments had also been conducted showing that protection could be secured by the proper grouping of a number of lightning rods.

At the session on Saturday the American Physical Society voted to create a class of membership for non-residents of North America, for which the annual dues are to be $4.00.

The Council of the Society was given power to undertake the arrangements for an International Congress on Physics to be held in Washington in 1915, providing such a congress is found to be feasible and can be properly financed. More than 80 members signified their willingness to subscribe for membership in such a congress.

Exhibits.

The laboratory apparatus and general equipment of the electrical and photometric section of the Bureau of Standards were open for inspection.

The Electrical Testing Laboratories, New York City, exhibited an electrodynamometer galvanometer, a phase-shifting set of transformers, a Sharp-Millar photometer, an integrating-sphere photometer, diagram and working drawings of a new photometer, a shock-testing apparatus for incandescent lamps, and other apparatus.

James G. Biddle, Philadelphia, exhibited a large number of instruments of foreign manufacture.

General Electric Company, Schenectady, N. Y., exhibited a series of 100-watt lamps, including a nitrogen-filled lamp with a consumption of one-half watt per candle, X-ray tubes, resistor material, insulating material, brushes, and various instruments.

Leeds & Northrup Company, Philadelphia, exhibited galvanometers, bridges, photometric equipment, an 8,000-ampere recording ammeter, etc.

Taylor Instrument Companies, Rochester, N. Y., exhibited electrical measuring instruments, pyrometers, thermocouples, etc.

Western Electric Company, New York City, exhibited a sine-wave oscillator and capacity-testing apparatus.

Among others exhibiting were the Navy Department, War Department, Case School of Applied Science, Carnegie Institution of Washington, Columbia University, Harvard University, University of Illinois, Lehigh University, Princeton University, University of Virginia, the Dubilier Electric Company, Emerson Apparatus Company, Esterline Company, William Gaertner & Company, Radio Telephone & Telegraph Company, the Scientific Instrument & Electrical Machine Company, Arthur H. Thomas Company, Thwing Instrument Company, Ultraviolet Ray Sterilization Company, United Gas Improvement Company, Wireless Specialty Apparatus Company, Wesleyan University, Radium Research Laboratory of the Standard Chemical Company.

Commercial Practice
Management, Rates, New Business

IS THERE A SATURATION POINT IN THE SALE OF ELECTRICITY?[1]

By J. S. Forbes.

Our Committee in getting up the subjects for the papers at this Convention, have asked us a question. In answer to this question, I would say, "Yes, there is a point that might be called the saturation point, but how are we to get to it?"

If we could get every house, every store and factory in our city, have each one equipped with every kind of current consuming device, then we would have reached the saturation point in the sale of electricity.

The Iowa State Electric Association's membership consists of managers of companies operating in comparatively small towns. These companies are unable to spend the money necessary for a separate department for securing new business. That part of the work must be taken care of by a man who has duties in other departments, but this in no way should interfere with each and every company operating in the State of Iowa, from having a first-class, up-to-date new-business department.

In traveling over the country investigating business possibilities in the smaller towns, the writer has invariably met this idea among the managers of the smaller towns. Upon request for possibilities of new business, it has been almost invariably stated by the manager, that the saturation point in his town had been reached. There were no more residences to get; there was no possibility of increasing the connected load in the stores; there was no possibility of increasing the connected load and increasing the length of burning hours on window lighting. "My town is too small for electric sign business."

The above answers have been received, and seem to indicate a lack of initiative on the part of the small central-station manager. They do not seem to realize that almost for the asking, they can increase the number of consumers; increase the number of current-consuming devices by a little concentrated thought and action on their part, devoting each day a certain fixed proportion of the time to that phase of the question. They do not seem to realize that any additional business that they can secure, even assuming that it is an expense of $2 or $3 per consumer to secure it, will give them an increased revenue, all of which is clear profit, excepting the amount of coal consumed to furnish the energy required.

To the managers of the small cities I certainly advise you to organize a new-business department, having it consist of the following main departments.

Illuminating engineer, who shall take charge of window and street illumination.

Power engineer, who will keep in touch with all the power possibilities in town.

Residence solicitor, who will not only secure all the house wiring, both new and old houses, but have in mind the current-consuming devices of convenience for the home.

Electric sign department, who will give ideas and secure figures on electric signs.

Of course, you as manager of the plant will necessarily have to be all of these departments and then some. Advertise these various departments on your monthly bills; make a window display by indicating that the various departments have been organized; talk it yourself and have all your men employed by you, talk about it, and in a small town it will soon be noised around that the electric light company is getting busy and going out after all the business.

Next, secure an accurate list of the possible consumers in each department, keep this list in a place where you will find it kicking around every morning to remind you that you might, on this day, increase your revenue by putting on additional customers, or by increasing the connected load of some of the other customers.

What are a few things your manager has to think of every day in conducting your business? For instance, is my coal supply far enough ahead? Is my pay roll ready? Are all my connect-ups arranged for today? Are all my bills collected? Is all the material needed ordered? And why not add to this list, How many kilowatt-hours can I arrange to sell today?

Do you realize that one kilowatt-hour per day for a year means, at a 15-cent rate, an increase in revenue of $54.75 a year? Do you realize that that revenue capitalized on a 20 per cent basis means increased value of your property of $270? Can you not then well afford to arrange your time so that 2 or 3 hours per day can be spent exclusively to increase your business?

You know more about the electric business than anyone else in your town. If you do not believe this statement, I am sorry for you. If you do not believe it, make yourself believe it, or at least run the bluff that you do. Your office should be the source of all information that is needed by your consumers, regarding electric matters, and if you let the fact be known that you are the best posted man in town, electrically, they will all come to you for advice. Give it to them. Make it your honest advice. Get them to use service that fully serves the purpose for the least possible expense to them per month. If you see people who are using electricity uneconomically, or wasting it, force your advice on them, and insist that they reduce their monthly bills. After you have advised, by changing their installation, or changing their method of operation, that which will save money on their monthly bills, you will be the best advertised man in your town, with lots of friends to boost your game. Then see your revenues increase. The customer who feels that he is getting the most that the company can give for a dollar, generally arranges to spend cheerfully, more dollars than ever before, and you are making more money out of him. He seldom is the man to kick for lower rates. He does not care how much per kilowatt-hour he pays, he has the service and he is satisfied with it, and is satisfied to pay his monthly bills.

The first question has now made room for another. How are we to reach the point in question? What are the cheapest, best and most effective methods to use in increasing our revenues?

The second question can be answered chiefly in one word, that is "Service." Service that serves, and service to customers will not only hold the customer already secured, but will bring in more

1 A paper presented before the recent convention of the Iowa State Section, National Electric Light Association.

new business than all the advertising or soliciting that you can do. It has been only within the last few years the central stations have maintained a department to go out, consult and advise with customers as to the best forms of using electric light, for both commercial and residential purposes, and also to advise them in regard to proper motor installations. In all cases where this plan has been adopted, material increases in business have been secured, but what is more important, material increased satisfaction to the consumer, has been the result with its increased advertising benefits.

Generally speaking, I believe the largest increase in consumers has been made in the residential sections. Partly on account of the many good current-consuming devices that have been brought out for use in the homes, and partly because central-station managers have realized the value of residential business.

One of our best methods in Cedar Rapids for securing old house wiring has been to advertise a complete installation of fixtures, lamps and wiring for 4 rooms for $21. The advertising for these campaigns has been done in a variety of ways, and in several cases we have analyzed the effect of the different classes of advertising, and we give herewith a statement of a campaign in Marshalltown, Iowa, showing in detail the results of this campaign.

REPORT OF HOUSE-WIRING CAMPAIGN.

November 21 to December 24.

Total residence wattage since November 21			34,285
Total contracts given to contractors			91
Total amount of contracts			$2,431.40
Division of contracts according to different means used in getting prospects:			
	Per Cent	Watts	Cash
Contracts secured through window display	30	8,829	$729.30
Contracts secured through hand bills	10	2,943	243.10
Contracts secured through newspaper	10	2,943	243.10
Contracts secured through office employees	10	2,943	243.10
Contracts secured through outside employees	10	2,943	243.10
Contracts secured through personal canvas	15	4,420	364.65
Contracts secured through neighborhood canvas	10	2,943	243.10
Contracts secured through street-car advertising.	5	1,471	121.55
Total cards received in office			65
Number of prospects from cards closed			35
Number of residences outside of limits of lines now erected or residences where new extensions would have to be built			13
Number of cards with wrong addresses or where parties were wanting information out of curiosity and not ready prospects			10
Number of houses estimated and parties yet undecided			1
Number of prospects estimated and could not be closed			6
Number of residences connected up during campaign that gave their contracts to non-operating companies			21
Number of new services connected up since November 21			101
Number of contracts yet to be completed			25

We find that this advertising of a fixed sum for a complete installation is the best bait to secure an interested possibility. After they have expressed a desire to have the service, and by their inquiry have intimated that they are willing to invest that amount of money to secure the service, it is very easy for a good salesman to induce them to make a complete equipment of their home.

As a general thing residential wiring should be taken up actively with the consumer when other work in the nature of repairs are being made to his home, or at house-cleaning time, and we are very active during those periods of the spring and fall in our residential-campaign work.

Our increase in commercial business has been brought about by a persistent campaign of education along the lines of scientific, efficient and up-to-date illumination.

The business men of today are becoming educated to the fact that the general public are attracted to their stores by attractive fixtures and appliances, including electric light fixtures and it is generally conceded by the average purchaser that the well illuminated store is the first-class store, and one in which they wish to trade.

The electric sign business is a very material factor in our revenues, and we call it a very good business, although with the 5-watt and 2.5-watt lamps in use, the connected load is not very great, but running them on a flat rate, as we do, until 11 o'clock every night, the number of hours burning makes the revenue quite satisfactory. It will take persistent work on the part of the manager of the smaller towns to sell the first one, unless the first one is the one over your own office, and it is pretty hard to sell to another man what you do not purchase yourself. But taking it from the standpoint of good advertising, I feel that eventually the merchants in the smaller towns will spend the money for the electric sign in preference to the painted sign.

Flat-rate window lighting is very profitable. Five years ago there were only 2 or 3 stores in Cedar Rapids that had any light in their windows after 6:30 P. M. At the present time every store of any importance has its windows well lighted, so that displays can be seen by the public until 11 o'clock each and every night.

But it was difficult at first to convince these business men of the importance of store front advertising. It was the hardest proposition I have ever tackled, when I tried to tell them that four-fifths of their rent was spent for location and window space, and that their cheapest and most effective advertising medium, their best salesman was being kept in absolute darkness, on an average of five hours each and every day of the year when the public were where they could see their displays. We adopted the scheme of counting the number of passers by at fixed points in the city between the hours of 6:00 p. m. and 11:00 p. m., and most of the merchants were surprised. They did not realize that as many people passed their store at that time of the night. We told them that the people passing at night were in more of a mood to look at their windows than in the rush of the business day, that the people were in more receptive mood as they sauntered up and down the streets at night to see what the merchants had for sale. The results of this campaign has been a well illuminated Cedar Rapids. Our revenues have increased even though the stores are closed now at 5:30 and 6:00, and in one instance I recall 65 per cent of the connected load of the store is used for street front advertising purposes.

The power business is being successfully handled by our new-business department through its engineering department. We have found it the cheapest and the best in the long run to spend the money in securing an accurate test of the amount of power consumed, also giving with this report, an outlay of motors and the cost of installation in each and every power job of any size. We will spend from a week to ten days, thoroughly investigating conditions, and make a written report to the manager of the company with whom we are endeavoring to do business. These reports are left with the manager. They convey to him the idea that we have given the matter very careful consideration, and from time to time we call on him and our conversation with him at that time indicates that, as a rule, our reports have been given very careful study.

Our small power solicitation is done in the ordinary way, giving advice in regard to size of motors, and the proper transmission from them to the machinery, and in all cases we have found that our readiness and ability to advise, and standing back of these recommendations, has given us a general hold on the power business in Cedar Rapids. The condition is such that with one exception no new steam or gasoline plants have been installed in Cedar Rapids in the last five years, and a great many of the old plants have discarded their steam outfits for electric power during that period. We operate, today, in Cedar Rapids, 90 per cent of the factories in the City, and have not in any sense given up the idea of securing the rest of them.

At this time I want to suggest to all of the companies represented the possibilities of the farmer business. This is a class of business that is almost entirely new, and up to a year ago con-

sidered by all of us, rather impractical and impossible for us to handle. It seems to the writer that the possibilities of increasing our sale of current by this method are very great, provided certain conditions can be secured, covering investment for this service.

From the figures collected from other companies and from our own meagre experience, I have placed the average monthly consumer at $1.25, if using light only, and an additional $2.50 if power is being used. Six consumers per mile is what we consider the average for these farmer lines, and this mile of line, at 2,200 volts, including transformers and secondary leads, will hardly be built under $600.

Upon the above basis it can be readily seen that this business is not a paying business if the company invests this $600. My suggestion at this time to all companies is that we adopt a uniform plan of taking on this business, which plan provides that the farmers along each road, organize a company, preferably an incorporated one, build their own line, furnish their own transformers and meters and purchase current of the lighting company from the primary at a point where their line taps the compay's line. This has been tried out in several places and the rates vary from 7.5 to 9 cents per kilowatt-hour on the primary, the farmers charging themselves regular city rates, the difference between the two rates being sufficient to pay for transmission losses and provide funds for maintenance and insurance. The important feature of this suggestion is that we all adopt a uniform contract and stick to it all over the State and I would suggest a committee be appointed by this Association to draft a form of contract and present it to the member companies for their consideration.

Card Index of Prospects at Louisville.

Robert Montgomery, manager of the commercial department of the Louisville Gas & Electric Company, is installing in his department a card index system which will cover the whole of the territory served by his company. The system will show at a glance who of the residents on any street are and not subscribers of either the gas or the electric services of the company. This system is designed to aid in the prosecution of the company's house-wiring campaign which is holding up to its average of about 70 contracts a week and which, the officers of the company have decided, will be made a permanent affair. Every mail brings numerous inquiries to the offices of the company as to the plan of the campaign.

New-Business Conference at Utah.

The first "Get Together" conference of the new business department of the Utah Power & Light Company was held in Salt Lake City, April 20 and 21.

This company during the past eighteen months has taken over the electric lighting and power systems of a majority of the towns in southern Idaho and in northern and central Utah.

This conference was called for the purpose of bringing the various representatives of the company, particularly the new-business department, in closer relationship with the general office and with each other.

About 30 representatives from towns outside of Salt Lake City attended the meetings, in addition to all employees in the head office interested in the matters under discussion.

At the dinner given by the company to its representatives at the Hotel Utah on Monday evening, the principal officers of all of the central-station companies in this district, and representatives of the manufacturers, jobbers and electrical contractors doing business in territories served by the Utah Power & Light Company were present as guests.

New York Companies Section Entertainment.

An entertainment meeting of the New York Companies Section, National Electric Light Association, was held in the Edison Auditorium, New York City, on April 20. F. C. Henderschott presided and introduced the lecturer of the evening, Harry C. Ostrander, who told of his recent trip through China and Japan. The talk was largely a description of personal adventures and was profusely illustrated with moving pictures. About 400 were present and at the conclusion of the lecture, the members were treated to a Broadway cabaret show, arranged for by E. A. Norman. Dancing concluded the evening's pleasures.

The Searchlight Salesman.

What has proven to be one of the greatest ideas for selling real estate in Southern California during the past few years is the "searchlight salesman" recently employed by the Harry H. Culver Company, of Los Angeles. This salesman is simply a powerful electric searchlight which has been placed on the company's land, Culver City, lying eight miles southwest of Los Angeles, the purpose of which is to attract the attention of the people of that section to that city. It is also used in the selling of real estate at night. From its location upon the top of a three-story building, its rays may be turned on any lot or series of lots in the entire tract, making the portion upon which it is turned as light as day. It is run from seven until nine o'clock every evening, except on special occasions, when it is kept burning later. The selling of lots in the city by this aid has proven so unique and satisfactory that night selling has been made a permanent feature of the company.

The light is a powerful affair of 8,500,000 candlepower and throwing its beam a distance of 32 miles. It is 30 inches in diameter and has a depth of 30 inches. It is 5.5 feet tall and may be turned in any direction.

The switch room is located beneath and is complete with switches, starting boxes, meters, etc., and also has a 60-cycle, 15-horsepower electric motor and a 56-ampere direct-current generator, having a speed of 1,800 revolutions per minute.

Louisville Central Station Co-Operates with Contractors.

Contracts for the wiring of Louisville, Ky., homes are being written at the rate of seventy a week by representatives of the Louisville Gas & Electric Company, which is pushing the campaign. The contractors themselves are securing about an equal number of contracts due very largely to the extensive advertising carried on by the company. These advertisements bring before the housekeeper the desirability of having her house wired for electricity so that she can then be able to use any of the electrically operated labor-saving devices for household use. Just now the vacuum cleaner is being featured. As the weather grows warm the electric fan will be featured.

Kansas Municipal Plants to Manufacture Ice.

A bill providing that all municipal light plants in Kansas may manufacture ice in connection with their regular business will be presented to the State Legislature at its next meeting. Attorney General Dawson has ruled that under the present laws no municipal plant has authority to engage in the manufacture of ice, unless a special act is passed by the Legislature. An effort to attain this end will be extended.

South Hadley, Mass., to Purchase and Distribute Electricity.

The town of South Hadley, Mass., formally took over the local lighting plant from the Amherst Power Company on April 10, and will operate the system as a municipal installation. Energy will be purchased from out-of-town central stations and distributed by the lighting department.

Electric Sign Data

Spectacular Electric Signs.

Spectacular electric advertising is the strongest feature of modern methods of publicity.

In considering the erection of an electric sign on a roof, for instance, where it will command crowded streets, it is well to remember that:

(a) The minimum cost of the framework, letters and wiring for a simple sign would be the largest part of the cost of a sign having more spectacular effects.

(b) The cost of operation after the sign is built will not be much more or less, perhaps, for spectacular effects than for a plain sign.

(c) The spectacular effect should not be overdone, long drawn out in duration of its cycle, nor foreign to the keynote of the advertisement.

(d) The sign should be of ample size, but quality is more important.

Evidently, a good sign is not easy to produce, but as everyone knows it is a very valuable advertisement if well done. And evidently it is worth doing as well as is possible.

If general publicity is of value to you do not overlook the electric sign method of securing it.

The city council of Burlington, Ia., has approved a number of agreements for the erection of electric signs in front of business houses.

There were nine applications for permission to erect electric signs in front of the respective business houses and the requests were granted. At the last meeting the marshal was instructed to investigate the erection of signs without the consent of the council and without the agreement that the city was to be held blameless in case of accidents or any other kinds of damages, and the large number of applications received came as a result of the investigation.

A start has been made in an electric sign campaign at Rome, N. Y. Current was recently turned on for the big sign which the Chamber of Commerce has placed over the south portals of the barge canal bridges at Mill Street, so that all who pass over the New York Central tracks at night may know that it is Rome, N. Y.

Permission for the erection of this sign was secured from the state authorities and the New York State Railways some time ago. The contract for the installation was let by the Chamber of Commerce to the Rome Gas, Electric Light & Power Company.

The Rockford Electric Company has introduced a movement among the merchants of East State Street, Rockford, Ill., for the installation of electric signs, in order that the street will become one of the best lighted thoroughfares in the city.

Through the instigation of A. C. Martin, of the Rockford Electric Company, letters have been sent out to twenty-five merchants of the street stating that the signs will be placed and installed free of charge in the event that the merchant orders them. Twelve favorable replies have already been received by the company from merchants who are in favor of the plan.

As East State Street now is lighted, many of the shoppers of the city who are only allowed evenings for their trading pass up the many stores in this thoroughfare on account of the attraction of the electric signs on the west side of the river. It is true that Seventh Street is better lighted than is East State Street and for some time there has been some agitation among the trade to improve the lighting system.

The Columbus Conventions & Publicity Association has asked for bids on a 65-foot electric sign, which is to be placed in the form of a modified arc on top of the Pennsylvania railway building facing the exit from the Union Station. The wording, "Columbus Welcomes You," is to appear in letters four feet high, except the initials, which are to be five feet. The letters are to be in white enamel with red edges, so as to make the sign attractive in daylight when not illuminated. The municipal electric light plant will supply the current.

Elyria, O., witnessed a stirring ceremony carried on by an enthusiastic outpouring of the population of the city, upon the occasion of the dedication, on April 24, of the city's new slogan sign and the outline lighting on the Henry L. Doherty property. The sign and outline lighting were officially turned over to the city, 8,000 persons participating in the ceremony.

Sketch for cigar-store sign contributed by the Greenwood Advertising Company, Knoxville, Tenn.

Dimensions of sign are 11 feet by 4.5 feet. The sign is double faced and is provided with 236 receptacles.

The letters are 14-inch raised spur block and the colors are natural cigar likeness.

Flasher gives effect of smoke rising from end of the cigar.

Electrical Construction

MODERN BUSINESS METHODS IN ELECTRICAL CONTRACTING.[1]

By Edward Kunkel.

There is no essential difference between modern business methods in electrical contracting and modern business methods in other lines of business. The underlying principles are the same. Methods and activities that will produce certain results in one line of business will produce similar effects in others.

We all have a pretty fair idea of what we consider the right things in a business way, and if each could set down his ideas in definite form, I believe they would all look very much alike, but probably differ widely in ideas as to best methods to achieve these results.

Of course, the primary idea of business is necessarily a selfish one. Away back in the savage or animal period the all-important thing, in the eyes of each individual, was to secure enough to feed and protect those dependent on him. The natural instinct when the supply of these things was limited was to prevent other individuals from taking more than their share of these things, by killing or driving them off.

This condition may be fairly compared to what we now term cut-throat competition, a state of affairs when each tries to get his share (or more) of the available business, by injuring or destroying the business of his competitor, by fair means or foul. This is an unpleasant and wasteful plan at best.

After a certain period of time, the savage man conceived the idea of co-operation, and found he could do better in the struggle for existence, by acting together with certain other individuals and banding together into tribes and communities, whereby their circumstances were very much bettered. They could then devote part of their time at least to creating new supplies, instead of fighting over those already in existence.

History shows us that every important step forward was accomplished by the combined effort of many rather than by individual effort. We have heard a great deal recently about co-operation and may be inclined to think that it is of recent origin, but this is not the case. It has been the keynote of progress through the history of man.

It is true there have been certain individuals of exceptional ability and energy who seemed to have achieved remarkable results and to stand out prominent and apart from the rest, but their careers have been more or less meteoric, and their influence largely of an educational value. The real progress of society, has been due mostly to the steady continued effort of many, working jointly to the common end.

The development of the electrical industry has gone through about the same course that society in general did. In its early days, there was the same story of individual effort; each pioneer working along in his own groove without the help or encouragement of the others.

We find Thomson, Brush, Bell, Edison, Westinghouse, and all the others, each following the course of his own thought, indifferent or antagonistic to the ideas of the others.

True, these men, having great natural ability and perseverance, produced wonderful results, but these results were largely of scientific and technical interest, and did not seem to very much affect directly the ordinary average citizen.

But now, since the industry has become highly developed and organized, largely through co-operative effort, we find that the ordinary daily life of every person is directly affected, in a thousand different ways, by electrical influences, appliances and conveniences.

Those of us who have been in the business for some years can remember when each separate manufacturing concern, basing its developments on the inventions and work of one man or set of men, would build up in a certain narrow way, and try to advance its own business and growth by antagonizing and belittling the work and products of its rival.

The same destructive competition prevailed to a large extent in the other classes: the lighting companies, the jobbers and the contractors, the individual in each class seeming to feel that his salvation lay in pulling down his competitor and climbing up over him.

In addition to this strife in the several divisions of the industry, there was general distrust and often open antagonism between the classes. The jobber claimed the business that the manufacturer was trying to get; and there was also friction between these and the central-station interests, making a fine three-cornered wrangle.

The contractor, being the "goat", and also generally the smallest, was the prey of all three of them. Each class felt it perfectly legitimate, besides being safe, to take a whack at him any time. Naturally enough, under these conditions, neither class nor individual could advance as his natural ability and effort justified.

Happily under the co-operative system, this state of anarchy is being greatly changed. The manufacturer has found that through the interchange of ideas and inventions, the comparison of production and factory methods, of accounting and cost systems, of business getting and advertising campaigns, and numerous other ways of working together, that both he and his competitor are better off at the end of the year financially; each has a warmer feeling for the other, and best of all, each has a greater measure of self-respect.

Similar results of co-operative effort, largely through the means of associations, have been obtained in the hands of the central stations, the jobbers, and, as all of you realize, among the contractors.

The feeling between the different classes has also become infinitely better, and in most localities a cordial relationship has been established.

Perhaps I have devoted too much attention to this subject of co-operation, but I cannot help feeling that this is one of the most important elements of modern business methods; not only for the electrical contractor, but for every other line of business.

It broadens a man's outlook in all directions and makes a more efficient business man out of him. Co-operation is also an important factor in the introduction of the various changes in business methods that differentiates

[1] Paper presented at convention of Iowa Electrical Contractors' Association.

the intelligent, up-to-date contractor from the hap-hazard guess-work type that was prevalent a number of years ago.

Another important element of modern business methods, I consider to be the substitution of the slogan "service" instead of price, relegating to the rear the old idea that cheapness was the necessary and all-important feature in business getting, and making prominent the various elements that make for good service.

Don't let it be said, any more, that the John Jones Electric Company gets a lot of business because its price is always low. Rather let your patrons get the habit of saying to their friends: "Get Jones to do your electrical work; he knows how; he keeps posted on everything and is up-to-date; he will take the time and trouble to tell you about something he knows of, that you need or ought to have; and will explain it to you so that you will understand it and thank him for the suggestion; he will get his men on your job when he says he will; and when he is through, it will be the job that is done, not you. He will go to considerable trouble to re-arrange his workmen, so as to get one of them to you in case of an emergency. He is always accommodating and obliging."

In many ways you can show that getting business and customers is no more important to you than taking care of them after you have them.

An especially important feature of an up-to-date business is a good accounting system, and the intelligent and accurate handling of such a system. I maintain that this is a vital matter; in fact, it ranks second only to a real practical and technical knowledge of the business itself.

If a business is not worth the application of a well designed, complete and accurate bookkeeping system, and the necessary intelligent, clerical help to keep it up, the business is not worth having. A man cannot afford to spend his time running a business unless he knows what it is doing; he had better get a kit of tools and go to work for someone else.

I once heard a contractor say that he did not need to keep a set of books; that he had a little memorandum book in which he kept a list of the people who owed him money and the amounts; he didn't try to keep track of those whom he owed: "Let them bother about that." A very simple system and easily kept! I don't know where that man is; I don't even remember his name, but I am certain he didn't get far in the world of business.

I don't mean to say, for a minute, that the smaller contractor should maintain an expensive and complicated bookkeeping system, such as would be suitable and necessary for some of the larger concerns; but I do say that every contractor absolutely needs a clear and well designed system, adapted to the size and character of his business with some provision for its future growth.

Other points of great importance in a modern electrical contracting establishment are:

(1) An intelligent and consistent advertising scheme.

(2) Prompt and accurate estimating methods.

(3) Concise and definite way of closing up contracts and other business.

(4) Careful and systematic handling of work after it is secured.

(5) A well arranged stock room and a systematic checking system for it.

(6) A tastefully arranged salesroom for retail supplies, appliances and fixtures.

(7) Prompt and insistent collection of accounts.

Each of these points is worthy of separate treatment, but this would manifestly extend my talk far beyond a reasonable length; and most of them are to be handled in detail by other speakers coming later. Therefore, I just mention them in this connection.

In closing, I wish to reiterate and emphasize these ideas: friendly co-operation in place of vindictive enmity and distrust; good service and high quality in place of low prices and inferior work; accurate records and a well planned organization in place of hap-hazard and wasteful methods; thoughtful planning and honest business ethics instead of cunning and sharp practices; kindly and considerate, but firm handling of your employees; honest effort and a legitimate profit.

Oregon Electrical Contractors' Association Shows Enterprise and Activity.

One of the most enterprising and active electrical associations is the Oregon Electrical Contractors' Association, which is affiliated with the National Electrical Contractors' Association. The local association has compiled and issued a valuable book for its members giving certain information with respect to prices of electrical supplies, and addenda showing simple means for figuring net profits and giving other necessary information for facilitating the work of the electrical contractor both in estimating and in billing out his work. The officers of the Oregon Electrical Contractors' Association are: president, R. G. Littler, secretary, F. C. Green, treasurer, J. R. Tomlinson.

UNIFORM PLANS AND SPECIFICATIONS.[1]

By Floyd A. Wallace.

Uniform specifications for electric work is one of those things to which this association and many others have given much time and thought and must continue to give much time and thought before any considerable results are accomplished.

The average specification is in a great part misleading and contains much useless matter, while the essential things are often left out and in many instances the specifications are little more than nothing.

When you consider that nearly every contract which an electrical contractor enters into states that work is to be done in accordance with the plans and specifications, you can easily see that the specification itself is of vital importance to the electrical contractor, as it really forms a part of the contract, and if parts of the specification are vague or misleading or not easily understood, then the contract entered into is vague and misleading, and unsatisfactory conditions are bound to be the result.

A set of specifications should state in the plainest English just what is expected of the electrical contractor in detail and should not have any useless matter; such as, repeating portions of the National Electrical Code in various sections of the specifications, when the rules have already been specified.

Any special conditions or rules to be observed should be distinctly and clearly stated and also any special apparatus to be installed should be fully described. Bear in mind that the specifications are a part of the contract entered into and therefore should be complete, distinct, and easily understood. In the matter of material to be used, the specifications should give complete details of types and styles, finish, and, when material ordinarily used is not desired, the specifications should enter into the description in detail. How many dollars have been lost by electrical contractors by entering into a contract to do work according to plans and specifications, when the specifications were so written that they could be construed to require apparatus much more expensive than that on which the contractor figured!

Uniform, definite, and complete specifications would mean that all contractors who figure on a job would know just what to figure on—and therefore, they would all base their estimates on the same class of work

1 Paper presented at convention of Iowa Electrical Contractors' Association.

and the same class of material and the large differences in bids now prevailing in the letting of a contract would be reduced, and better conditions prevail in this respect.

The ideal of uniform specification cannot be attained by individual effort, neither by the efforts of a group of individuals, but only by the concerted effort of all of the interests affected thereby, and I believe that contractors' associations are the most interested of all, and should give this matter close attention; not let the thing die between meetings, but keep hammering until results shall begin and show for our efforts. I believe that this body should take decisive action in this matter at this meeting and get to work for the attainment of the desired end at once. For just as soon as a standard specification is adopted generally by the architects, just so soon will the leak be stopped from the pocket of the electrical contractor.

We must expect opposition in the adoption of standard specifications from many of the architects because they, in a large part, copy specifications from textbooks on architecture, and it, at times, seems as though the architect deliberately garbles a specification to confuse electrical contractors and thus get a cheaper job. Furthermore, a standard specification would eventually mean the doing away with much of the cheaper class of work and materials; such as, the use of cutouts in a cabinet when a panelboard would be a great deal better, and this would be opposed by certain persons who believe that anything that will "get by" is good enough.

Certain of the less desirable class of property owners would oppose these measures on the same grounds, but on the whole, the better class of architects and owners will favor anything that will tend to bring out a clear statement of contract between the electrical contractor and the owner.

A standard form of specification covering all electrical work in detail would have a further tendency to do away with the present custom of letting the contract for the electric motors required in a ventilating system to the ventilation contractor or for electric generators to the persons installing steam plants and engines.

I have prepared a list of items that should be included in a specification for electric wiring, for your consideration and discussion. Please do not understand that I give you this as an ideal or even as being complete, but rather consider it as a basis for discussion to the end that a complete and perfect thing may be brought out of the present mixed-up conditions of affairs.

(1) Bids; (2) Drawings; (3) General systems; (4) Quality of work and rules to be followed; (5) Entrance and service connection, location, etc.; (6) Meter setting, location, etc.; (7) Mains and feeders; (8) Special material and class of work; (9) Wire shafts; (10) Center of distribution; (11) Cutout, cabinet and panelboards; (12) Branch circuits; (13) Class of work; (14) Specification of material; (15) Details of installation; (16) Switches and control of lights; (17) Outlets—floor, wall, and ceiling; (18) Fixtures and cords; (19) Lamps; (20) Window Lighting; (21) Decorative or special lighting; (22) Signs; (23) Motors and motor circuits; (24) Location of rheostats and controllers; (25) Fans; (26) Telephone and bell systems; (27) Ordinances and inspection fees; (28) Manner of changing locations and pay for same; (29) Schedule giving summary and total of all outlets, etc.; (30) Guarantee and bond; (31) Retaining and final payments.

An Electric Illusion in Window Display.

The illustration herewith is from a picture of a window display installed by the Sterling Electric Company, contractors and supply dealers, Minneapolis, Minn., and is somewhat of an illusion. The very brightest spot in the display appears to be absolutely black. This particular spot is the coiled filament of a 3,000-candlepower Laco nitrogen-filled tungsten lamp, which is seen hanging above the center of the display. The general illumination of the window was so intense that it caused the photograph to have a foggy appearance.

Another peculiar thing is the reflection on the window pane of the Corinthian five-light standard at the curb, some 10 feet from the window. This is caused by the volume of illumination giving the window the effect of a mirror. An illusion can also be noticed at the extreme left side of the picture. By looking at this part of the picture there appears to be another complete and separate display. The most peculiar thing of all is that none of the illusions shown in the picture can be seen with the naked eye when viewing the display.

Window Display of Sterling Electric Company.

Universal and Selective Motors.

The increasing use of small motor-driven portable tools and numerous motor-driven household devices such as vacuum cleaners, sewing machines, etc., has created a demand for motors that can be satisfactorily operated in all sections of a city regardless of whether alternating or direct current is available. Two types of motors that meet these requirements are on the market, being known as universal and selective motors.

The universal motor, as its name implies, is a motor which will operate on both alternating and direct current without any change being made in the windings. Such motors are always of the series type, both the field and armature structures being laminated to insure low power-factor and satisfactory operation on alternating current. However, there is always one difficulty that has to be overcome in the design of a series alternating-current motor which is the tendency for such motors to spark, due to transformer action between the field and the armature while

an armature coil is being short-circuited by a brush. This trouble can be minimized by the use of a small number of armature turns, which, however, means a high speed of rotation. Most portable devices, however, operate at a high speed so that universal motors having speeds in the neighborhood of 8,000 revolutions per minute have a large field of usefulness. When low speeds are required special design is necessary. A low-speed universal motor was described on page 687, ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, for April 4, 1914. In this motor a resistance is inserted in series with the field, the armature being shunted across part of this resistance. In this way a comparatively uniform field is obtained, and owing to the reduced voltage across the armature, only a small number of armature turns is required for low speed. The power-factor of the field and armature will be nearly the same with this arrangement, and due to the uniform field, a nearly constant speed is maintained at all loads.

However, no strictly universal motor has as yet been designed, the motors all being universal at only one load, as the characteristic curves on alternating and direct current vary widely. In selecting a universal motor it is therefore necessary to accurately calculate the load at which the motor will operate, if the best results are desired. Under these conditions the universal motor will be found to be satisfactory for many small-motor applications. Their efficiency, however, due to their small size and the compromise in their design, is not very high, often being about 35 per cent. Such efficiencies, however, are not of great importance compared with the other advantages.

The field of the universal motor can be extended by employing resistances in series with the motor when operating on direct current or low-frequency alternating current. Under these conditions the characteristics of the motor on alternating and direct current can be made to be somewhat similar. Such motors have been built in comparatively large sizes and are giving satisfactory service. One example is that of the motors of the New York, New Haven and Hartford Railroad's electric locomotives which are supplied with alternating current on the main line and with direct current at the Grand Central Terminal, New York City.

The selective motor is also a series motor, but it employs separate windings for alternating and direct current. In this way the windings may be selected to suit the current available. These motors are also of the high-speed type and are generally made in only the smaller sizes.

M. Edwin Arnold.

Intelligent, energetic and enterprising effort seldom fails to win appropriate appreciation and reward. A company which is characterized by enterprising and progressive policies, supplemented by an energetic head who keeps closely in touch with business conditions and the proper conserving of its resources is pretty sure to meet with success.

These statements are well exemplified in the career of M. Edwin Arnold, head of the firm of M. E. Arnold & Company, electrical contractors in Philadelphia, Pa. Mr. Arnold is a man intimately conversant with the various phases of his business, which include the supply and installation of everything electrical.

Mr. Arnold was graduated from Girard College, Philadelphia, in 1894. He secured a position in the Philadelphia office of the General Electric Company at once, where his work was of a very practical nature. Later he was employed by the Bell Telephone

M. Edwin Arnold.

Company and several large wiring contractors of the same city. In 1897 he organized the firm of M. Edwin Arnold, which was later changed to M. E. Arnold & Company, although the business is still conducted by Mr. Arnold individually. The business grew steadily from year to year, necessitating several removals to larger quarters. In 1904 the premises at 114 North Eleventh Street were secured, and in 1912 an additional floor was added at the same address, where the firm has continued uninterruptedly its business.

Mr. Arnold has always taken a wide interest in the larger activities connected with his line of business. He was one of the original members of the National Electrical Contractors' Association, and was the delegate from Philadelphia to the Denver convention of the Association. He is president of the Electrical Contractors' Association of the State of Pennsylvania and is also president of a local association known as the Philadelphia Electrical Contractors' Association. He is a Jovian and is treasurer of the local Jovian Electrical League. The firm is a member of the Society for Electrical Development.

Mr. Arnold's residence is in the beautiful suburb known as Germantown, and he makes his way to and from his office by automobile, as motoring is his principal recreation.

Electrical Work on an Enormous Coal Dock.

The Erner-Hopkins Company, of Columbus, O., is the successful bidder for the electrical work on the new $2,000,000 coal docks of the Hocking Valley Railroad Company at Toledo, O. This is the most important operation of its kind on the Great Lakes and has been over a year in building. Two 75-kilowatt engines and generators, together with housing and connections, are the principal electrical features. They will furnish power to a pair of giant Brown hoists, built at Cleveland, O., and said to be the largest ever turned out of the shops. Each has a capacity of lifting direct from the switchback tracks a coal car of 100-ton load and dumping into the hold of a vessel at the rate of about one car per minute. The concrete slips into which the vessels tie up for loading will accommodate at one time five of the largest coal carriers on the lakes. Added to the electrical apparatus to be grouped about the two slips, the contract includes the wiring and lamps for the entire docks, which extend a long distance along the water front, and which will accommodate thousands of coal cars awaiting transshipment by boat. The lighting requirements will be met by 100 lamps, each of 500 watts. The contract amounts to about $15,000. It must be completed in readiness for the navigation season. Toledo is now said to be the greatest soft-coal loading port in the world, being the gateway for the Northwest for mines throughout Ohio, West Virginia and Kentucky. A large force of men has been engaged.

Municipal Electrical Inspection Begun in Jacksonville, Fla.

The City Council of Jacksonville, Fla., has recently passed an ordinance creating the position of city electrical inspector, requiring all electrical work to be inspected by him or his assistants, and specifying the fees for the inspections. The ordinance also establishes the National Electrical Code as the basis of installation rules, but contains some additional requirements necessitated by local conditicns in the city. I. L. Barnes is city electrical inspector; L. F. Beerbower and F. B. Miller are his assistants.

Steel Towers for Panama Wireless to be Erected by Columbus Contractors.

The Childers Construction Company, of Columbus, O., has been awarded the United States Government contract for the erection of three steel towers in the Panama Canal Zone that will be used for the wireless station. Each of the towers will be 600 feet high, with a 150-foot triangular base, tapering to 10 feet at the top. The three towers will require 1,000 tons of steel. The towers will be about 90 feet apart and located near Gatun. J. L. Childers sailed for Panama on April 2, to begin the preliminary work of construction. It is expected that the towers will be completed in about five months. The steel is being fabricated at Toledo, O., and part of it is ready for shipment. Mr. Childers had a prominent part in the steel work already done at the locks, under the McClintic-Marshall Company, of Pittsburgh. His brother, W. B. Childers, who remains in charge of the Columbus headquarters, was general superintendent of the Gatun gates contract, and this time a year ago was working a force of 2,500 men. The Childers Construction Company contract, which is confined simply to setting the towers in place after the material has been delivered, involves about $50,000.

Oil Thrown From Bearings.

Sometimes the "trouble shooter" or wireman from a contractor's shop will be sent out on a complaint of a motor throwing oil from its bearings. This is generally caused by the rings picking up so much oil from the well and carrying it onto the shaft that it is impossible for it to leave the shaft by means of the lubricating oil grooves fast enough. The oil will then creep along the shaft until outside the bearing housing, where the centrifugal force will throw it off in small drops or as spray.

The manufacturers use various means to eliminate this, one of the most common being to cut a groove about one-eighth to one-quarter inch wide, and correspondingly deep, in the bearing near the ends. A hole is drilled through this groove in the bottom of the bearing to allow the oil to escape as it is collected on the shaft. Very often this groove is not cut deep enough, or the hole in bottom groove may be plugged up with dirt, waste, etc., and cause oil throwing. The groove should be cut deeper and hole cleaned out or drilled out a little larger in this case. It may sometimes be necessary to drill an additional hole in the bottom and cut the groove as deep as the metal will allow before the oil throwing is stopped.

H. W. Parsons.

Among the Contractors.

A new electrical contracting establishment, which commenced business on March 1, is the City Electric Company, at 200 California Building, Tacoma, Wash. M. R. O'Keefe and J. J. O'Keefe, who comprise the organization, are both men with a number of years practical experience in the electrical contracting line and they enjoy a large acquaintance in Tacoma.

The Shiery Electrical Company, Urbana, O., has been handling a large volume of wiring and other house work under a special offer to wire and install fixtures for $55. The company guarantees its work to pass state, insurance and other inspection, giving certificates to that effect. The campaign is incidental to one on behalf of the company's line of electric appliances.

J. Don Alexander has recently purchased the stock and business of the Goeller Electric Company, at 613 Sprague Avenue, Spokane, Wash., and will conduct a general electrical and contracting business under the name of Alexander Electric Company. Mr. Alexander has had over eight years' experience with the Washington Water Power Company in their motor and meter departments and has a broad knowledge of electrical conditions in Spokane. He has had 12 years' experience in the electrical business, having taken the apprenticeship courses at the Westinghouse Company and the Allis-Chalmers Company.

J. J. Agutler & Company, of 73 Madison Street, Seattle, Wash., is installing the electrical equipment of the Liberty Theater, the Ames Building and the Peterson Building, all of which are situated in Seattle. The company is also installing the electrical equipment in the five new buildings for the state insane, at Sedro Valley, Wash., and also the electrical work on the Cheney Normal School, at Cheney, Wash. A recent installation completed by this company is that of the new Elks' Club Building in Seattle.

Buxbaum and Cooley, of 68 Columbia Street, Seattle, Wash., is building some interesting apparatus for the Sessnon Lighterage Company, of Nome Alaska. This consists of a 10,000-candlepower searchlight and a five-kilowatt motor-generator set to deliver 55 volts to the searchlight. The motor had to be constructed specially for the purpose, the speed required being 900 revolutions per minute. The searchlight will be used for lighting up boats and lighters at a distance as great as two miles from the beach.

The Gem City Electric Company, Quincy, Ill., has recently installed 25 motors at the factory of the J. R. Little Metal Company, and 11 motors and three 10-kilowatt transformers at the new Morris Brothers' shoe factory. Both of these installations are located in Quincy and are furnished with 25-cycle, 440-volt alternating current from the distribution circuit of the Mississippi Valley Power Company. The Gem City Power Company recently changed the plant of the Ruff Brewing Company, of Quincy, from steam to electric power, and is doing the same at the plant of the Menke Stone & Lime Company. The firm is also installing motors totalling 130 horsepower in capacity, together with a lighting system at the filtering plant of the Citizens' Water Works. Many smaller contracts were obtained, due to the lighting company changing its power from 550 volts direct current to 440 volts alternating current.

The Sterling Electric Company, of Minneapolis, Minn., has secured the contract to furnish material and install an electric light plant for the Browerville Electric Light & Power Company, of Browerville, Minn., consisting of a 25-kilowatt generator and a 220-volt 120-ampere storage battery. The contract price was $5,000.

The Avery-Loeb Electric Company, Columbus, O., has received through the Wayne Oil Tank & Pump Company, of Ft. Wayne, Ind., the contract for installing 28 motors in the new factory of the Hanna Paint Company, Columbus, as a part of the system for distributing oils and other liquid paint materials through the factory. The contract amounts to $1,500. Another contract received by the same company is the underground wiring for elevators and lighting in the new Pennsylvania railway station at Piqua, O. This concern will also have the wiring and lighting work for the Made-in-Columbus Exposition to be held in booths encircling the State House Square, in June.

The United Electrical Company, of Marion, O., has secured the contract for the new Elks' hall at Marion. The improvement includes a fully equipped theater. Wiring and lighting will amount to about $2,000.

A contract has been let by Ohio State University to the McKeever Electric Company, of Columbus, O., for lighting and power in connection with the new physics building now in course of construction on the University campus. The contract will amount to approximately $800.

National Association of Electrical Inspectors.

THOMAS HENRY DAY, President, 59 Deerfield Street, Hartford, Conn.
H. S. WYNKOOP, Vice-President, 13 Park Row, New York, N. Y.
WILLIAM LINCOLN SMITH, Secretary and Treasurer, Concord, Mass.
JAMES E. COLE, Representative on Electrical Committee of National Fire Protection Association, 11 Wareham Street, Boston, Mass.

Executive Committee
EUGENE N. DAVIS, Chairman, Brookline, Mass.

SECTION REPRESENTATIVES:
C. H. Fletcher, H. Burnes, British Columbia.
A. W. Hopkins, G. W. Perry, Western New England.
Washington Devereux, A. H. Engle, Philadelphia.
E. N. Davis, H. A. Knight, Eastern Massachusetts.
C. A. Hannan, O. E. Smith, New York City.

MEMBERS AT LARGE:
George L. Collison, Frank R. Daniel, James H. Fenton, F. G. Hartwell, J. E. Latta, James B. McCarthy, Thomas D. McColl, C. W. Mitchell, A. A. Moffitt, R. P. Strong

"LET THE CODE DECIDE."

Secretary's Message.

The Secretary's annual report is in preparation and will shortly be sent to each member. He desires to state here that since the biennial meeting in March, 1913, the membership of the Association has doubled. It is also a satisfaction to be able to state that out of the twenty odd members who were at that time liable to be struck from the rolls on account of arrearage in dues, all but one (who has been dropped) are on the list in good standing today.

E. M. Addis, of Brattleboro, Vt., has become a member of the Association, having joined the Western New England Section at its last meeting.

Thomas P. Hussey, municipal inspector of Marblehead, Mass., has also become a member, having joined the Eastern Massachusetts Section recently.

One of the most important questions now coming to the front to disturb whatever equanimity the harrassed inspector may still possess is that of the use and installation of the nitrogen-filled high-power tungsten lamp.

This question has been referred by the Electrical Committee, National Fire Protection Association, to a special sub-committee of which our representative, Commissioner Cole, is chairman. Such matters as type of socket to be used, suitable wire for use in fixtures, etc., allowable closeness to surrounding combustible material, and many others which will doubtless occur to all, are to be considered.

The Secretary earnestly hopes that any of our members having any experience whatever with these lamps will make it a point to communicate his data with full detail to him. This is one way in which each member can, without serious exertion, do a little to assist the officers in their work; such information would not be published, if the writer so desired, but would be transmitted to Mr. Cole as field information to assist his committee.

The Secretary particularly recommends this question as especially interesting for consideration by the various sections and would suggest that it form a subject for a section meeting, the discussion thereon to be sent in to this office by the section secretaries.

The matter appearing in this section consists of questions on the National Electrical Code, its interpretation and meaning, and questions as to whether certain methods of wiring are in accord therewith. These questions are gladly received from anyone interested, even if not a member; they should be sent to the secretary with any needed elucidating sketch. They are answered by each member of the Executive Committee according to his knowledge of what the ruling would be in his jurisdiction.

It should be understood that no pretense is made to give an authoritative interpretation of the Code. This is a voluntary association; it has representation on the Electrical Committee of the National Fire Protection Association, which prepares the Code, but it has no right, and claims no right, to give a final interpretation of anything in the Code. It is only intended to give the interpretation which seems correct to the members of the Executive Committee. No attempt is made to edit or correlate the answers from the different members of the Committee, as it is felt that the occasional difference of opinion is calculated to lead to a further study of the matter in question, further discussion and the final clearing up of obscure points.

The aim is to help toward a better understanding of the Code on the part of all; a more uniform conception of its meaning; increased precision in applying it; and harmonious action of those using it, for the common good.

The following important communication has been received from President Day.

The President is in receipt of the following letter of inquiry. Other than expressed in his answer, he is without any experience. The letter comes from an active and enterprising city in the Middle West. The President would appreciate any word, from our membership, which might be of assistance to the gentleman making the following inquiry:

About two years ago the city commissioners of the city of ———— adopted an electrical ordinance. This ordinance was a part of that submitted by the writer. About a year ago the ordinance was partly amended to require conduit wiring in fire limits and conduit service for all light and power service wiring. We made an effort the first time, as well as last year, to have the commissioners adopt the National Electrical Code as part of the electrical ordinances. The city commissioners felt that the city could not afford to reprint the Code as part of the ordinances and refused to insert the words "The rules and requirements of the National Board of Fire Underwriters are hereby adopted as the rules and requirements for electric wiring in the city of ————." This year the electrical contractors of the city made an effort to have the commissioners insert this phrase as part of the ordinances. The request was refused for the reason that the commissioners stated that the Supreme Court ruled against the City of Springfield, Ill., which had a similar requirement in its electrical ordinances.

There are several electrical contractors in the city of ————, many of whom follow the Code for their standard of wiring irrespective of the fact that the city ordinances do not call for all wiring to be done in accordance with the Code. There are, however, several other contractors who insist on using single-braid wires in conduit, refuse to put boxes on the end of conduit, armored cables, etc. We are wondering whether you have had any experience with cities where the courts ruled against the insertion of the Code as part of the ordinances, and what is the best method of getting around this ruling of the courts. You understand, of course, that the city commissioners refuse to go to the expense of printing the entire Code. For your information we are enclosing a copy of the city electrical ordinances.

We should very much like to hear from you as to suggestions, and can assure you that we will appreciate anything that you can do towards clearing up the situation for us here.

Very truly yours,
ENGINEER.

To this the President has replied as follows:

Dear Sir:

In answer to your inquiry of the 13th, I beg to state that I have never heard prior to your inquiry of any objection to a city ordinance giving recognition to the National Electrical Code, the recognized and accepted standard for the installation and application of electrical wiring and apparatus.

I know of a number of cities with ordinances having the words, "and the National Electrical Code shall be the

standard of electrical installations." I have known of others that had a slight change in the above language, to wit, "and the National Electrical Code, as it shall appear from time to time, etc.," this latter language binding by local legislation several interests and the citizens to a condition which only the future can determine. This is not thought to be legal. The first form indicated is that most generally used.

Giving recognition, in the above manner, incurs no obligation on the part of a municipality to have the National Electrical Code printed.

A supply adequate to the needs of a municipality can be procured free of expense from the proper place. It is a well known fact and indeed it is a practice in many places for the electrical contractors and the supply companies to procure a sufficient number of copies for their employees with no expense to the municipality.

Some of the larger cities, like New York and Boston, where, because of conditions peculiar to these places, the National Electrical Code does not completely fill the needs, have printed their own edition of the Rules, such editions containing the special local rules for the treatment of the existing conditions.

I have been retained in law suits where some of the questions involved have been adjudicated by the requirements of the Code and that part of the Code that pertained to the questions in dispute has been accepted by the Court and admitted in evidence. Beyond the few facts I have mentioned, I am without any experience. However, I will present your letter to our Association in the usual manner and, should I receive further advice, will be pleased to communicate such to you.

Very truly yours,
Thomas H. Day,
President.

The Secretary particularly requests our members who act under municipal and statutory authority to inform him regarding the matter of the above letters, particularly as to how the question is handled in their several jurisdictions. He would be especially grateful for either the quotation of the decision of the Supreme Court of Illinois, above referred to, or a reference to the case in the Illinois reports (if indeed there be one and the above not referred to merely *obiter dicta*).

He may be permitted to suggest that a very simple way out would be the adoption of a by-law authorizing the proper official to establish suitable "rules and regulations for the installation of electrical wiring for light, heat and power distribution purposes within the city of ————," which is perfectly proper, and then under that by-law let the official promulgate the National Electrical Code and his set of supplementary rules.

Thus in Massachusetts we are governed by two provisions, in part as follows (Revised Laws, 1902, Chap. 104, Sect. 1): "Every city and every town which accepts the provisions of this section may for the prevention of fire and the protection of life by ordinance or by law . . . . regulate the inspection, materials, construction, alteration and use of buildings, etc. . . ."

Also (Chap. 122, Sect. 18): "Every city shall, and a town may at an annual meeting instruct its selectmen to appoint an inspector of wires who shall . . . . supervise every wire within a building designed to carry a light, heat or power current . . . . and shall see that all laws and regulations relative to wires are strictly enforced."

The first of these gives power to promulgate by-laws or ordinances with penalties for disobedience, and the second authorizes the appointment of the inspector.

Under these two, my own town adopted a by-law simply saying that no person should use any electrical wire, fitting or appliance within a building until the same should have been approved by the inspector of wires, under such and such a penalty, and that said inspector should have power to make and promulgate rules and regulations governing the use and installation of such wires, fittings and appliances, not contrary to law, as he should from time to time consider necessary.

The statue further provides that the rights of the several parties in case of controversy are protected by invoking the Superior Court in equity, so that in a way after appointment the inspector of wires is a public officer and his decision not subject to review by the local town officials, thus protecting him from possible petty political interference.

Section Meetings.—The Secretary of the Western New England Section, R. G. Forsyth, of the Greenfield Electric Light & Power Company, reports as follows:

The regular bimonthly meeting of the Section was held on Monday, April 13, in the Y. M. C. A. Building, Hartford, Conn., President George W. Perry, of Hartford, presiding. After the reading of the minutes of the last meeting, the Secretary presented to the Section a communication from the National Secretary containing four questions which had been sent in to his office and by him communicated to the several Sections for consideration. Upon motion it was voted that the consideration of these questions be deferred until the regular June meeting, that each question be referred to a committee of two, said committees to work in conjunction with the Chairman of the Executive Committee, City Inspector M. S. Nettleton of New Haven, in preparing papers for presentation and discussion.

President Perry then presented the speaker of the day, David E. Bartlett, engineer of the Underwriters' Laboratories, who presented an address upon the work of the Laboratories. In beginning he paid a tribute in well chosen language to William H. Merrill, the founder and present manager of the Laboratories, and later illustrated the breadth and scope of the work being accomplished by a large number of lantern slides, which showed in a clear manner the method of making some of the many tests referred to. An abstract of the address follows[1].

Address by D. E. Bartlett.

General Remarks.—It gives me much pleasure to have this opportunity to speak to you this morning, not only personally, but in my capacity as one of the engineers in charge of the work at Hartford and vicinity for the Underwriters' Laboratories, which organization as you are doubtless aware, is the most important of its kind in the world, and is probably well known to you by reputation and also by experience in your inspection work in the different municipalities.

Origin and Development of the Laboratories.—I will first outline to you briefly, the history and development of the Laboratories, which I have been so fortunate as to obtain through the courtesy of William H. Merrill, the present manager of the Laboratories and also its founder. (This information you will find given more fully, accompanied by illustrations, in the quinquennial issue of the *Spectator,* published in May, 1913.)

The Underwriters' Laboratories first started from a bench, table, some electrical measuring instruments, and a few chairs, located on the third floor of the Fire Insurance Patrol Station, Monroe Street, Chicago, Ill., the staff consisting of Mr. Merrill, one helper, and one clerk.

This work, however, was extended to embrace the territory of the Western Union as well as the Chicago Board, the organization then being called the Underwriters' Electrical Bureau, and operated as a joint effort of the two organizations.

The electrical testing work which the office began to turn out attracted the attention of territory outside the Western Central District, and together with reports on electrical fires and model blank reports, gained a small allowance from the National Board of Fire Underwriters, the name being then changed to the Electrical Bureau of the National Board.

The invention of the acetylene gas generator increased the extent and scope of the work, necessitating larger quarters. After leasing various premises to supplement those at the patrol house, the organization was finally moved to a two-story brick building with adjoining lot, on East Twenty-first Street, Chicago. The next step was to incorporate under the laws of the State of Illinois, a charter being granted to "establish and maintain laboratories for the examination and testing of appliances, and to enter into contracts with the owners and manu-

1 According to the provisions of the Association's Constitution, the Association assumes no responsibility for statements or opinions expressed in any papers, articles or discussions, unless such paper, article or discussion has been submitted to the Executive Committee, has been approved by said Committee and carries at its head a statement to that effect attested by the Secretary. In any other case the responsibility lies with the author alone, and his name shall be attached thereto.

facturers of such appliances and devices respecting the recommendations thereof to insurance organizations."

In 1904 the quarters which the Laboratories then occupied on East Twenty-first Street proving inadequate for their needs, they determined to erect a building of their own, and after securing land on East Ohio Street, they erected their present structure, consisting of a model fireproof building, three stories and basement in front, and one story in the rear. In 1908, the plant was extended 66 feet to the east, and in 1911-12 a steel and concrete structure with ground area 66 by 70 feet in the rear of Building No. 2, was designed especially for test work in structural methods and materials. In 1913 additional land was obtained, thus allowing plans to be started for the extension of the plant to cover an entire frontage of 266 feet, holding in reserve a portion of the land in the rear for yard purposes.

In 1906 after originating the service of labeling and inspections at factories, it became necessary to establish offices outside of Chicago, the first field office being at Boston, in charge of Franklin H. Wentworth. The great favor with which this service was received resulted in agencies for the Laboratories and inspection offices covering the work being established in 67 cities of the United States and Canada. In 1911 the volume of electrical business made it advisable to establish an electrical testing office outside of that at Chicago, which was accordingly done in New York City.

The Underwriters' Laboratories are engaged exclusively in experimental work along the lines of fire-protection engineering and testing devices and materials having a bearing on fire hazards, being the only plant of the kind in existence for such purposes.

Each and every device which has been tested or examined by the Laboratories is recorded on cards, approximating 5,000 in number, and arranged alphabetically in files by the kind of hazard and device, such as:

Acetylene-gas generators, gasoline engines, electrical devices, fire retardants, i. e., extinguishers, fire doors, shutters, etc.

The cards bearing approved and non-approved articles are so marked, and where not approved the reason is given on the card.

If the manufacturer of a fire-protection device wishes the stamp of approval of the Laboratories, he must first submit it for a rigid test as to advantages claimed for it. Any defects discovered are brought to his attention, and where they can be remedied he is so informed; until all such defects or dangerous features are eliminated, the device is not approved.

Label Service.—I will make a few remarks as to the relationship of the label service of the Underwriters' Laboratories to the safeguarding of public welfare as regards fire protection and loss.

The inspection work is based on standards issued by the Laboratories, containing accurate descriptions of the device to be labeled and giving with it a report requiring the careful inspection and examination of the product which is offered for label service. On examination, if such article conforms to these standards, labels are permitted to be used on the device described.

Rubber-Covered Wire.—You will also probably be interested in knowing the method of testing the rubber-covered wire with which you doubtless come in contact in your regular routine.

On visiting the wire plant, the inspector first goes to the stock room, there selecting stock coils of various sizes of wire giving a fair representation of the wire output from time to time. These coils selected are then taken to the testing department where the man in charge unwraps the coils, putting them into their regular testing tank for tests to be made on the following day, at the same time samples being taken from some of the coils for physical tests on the rubber compound and for wrapping tests, a sample being selected from one of the coils to be sent to Chicago for the check tests and chemical test of compound. The following morning, the coils previously put into the tanks are subjected to voltage test according to the several sizes of wire as given in the National Electrical Code, also to megohm test to see if the insulation resistance is up to that required in the Code for the different sizes.

The National Board has now given an appropriation enabling more buildings to be used for the testing of this wire, and when these are finished, the chemical laboratory facilities will be second to none in the country. German and Italian inquiries have been received which may possibly result in business abroad. A London, Eng., office has been established, and the factories served have increased very greatly. Branch offices also have been increased for this class of work.

Snap Switches.—You probably run across the testing of switches in your work, so a word regarding them will not come amiss.

The inspector on going to the factory proceeds, as before mentioned, to the stock room or assembly room and selects at random such switches as are ready for labels, then taking them to the testing room of the plant and subjecting them to an overload test of 50 per cent of their rating and operating with this load for 50 complete consecutive cycles. A portion are then left with the test man for an endurance run of 6,000 cycles and also a heating run at the maximum rated load of the switch; that is, on a switch rated 5 amperes, 250 volts and 10 amperes, 125 volts, the heating test would be on a current of 10 amperes.

Insulating Joints.—The testing of insulating joints is done in a similar manner, they being tested for one minute at 4,000 volts, some of them for five minutes at 4,000 volts. Joints which are made for combination gas and electric fixtures, are tested also for leakage, being submerged in water and a pressure of 25 pounds per square inch applied to them one minute.

On July 1 a new set of specifications will go into effect requiring additional electrical tests of these joints; also mechanical tests as to their tensile, bending and tortional strength.

The above described duties are, of course, only a small portion of the work which the inspector has to deal with in the course of his inspections, but are the ones I thought most interesting to those present.

In Conclusion.—I would like to say a word regarding the great service which these Laboratories are rendering and have rendered to the public at large in the matter of cutting down the appalling loss by fire in this country, also in Canada, as there are neither state laws nor state officials whose duty it is to regulate or prohibit the installation or use of dangerous devices. Were it not for the rigid tests and investigations of these Laboratories, the loss of life and property from fires would be much greater than at present.

This work is not only one of great benefit to manufacturer, buyer, user, and property owner everywhere, but is also a work of humanity as represented in the saving of loss of human life alone.

During his address, Mr. Bartlett explained in great detail the methods of making the several tests of rubber-covered wire, covering both factory and field experience. He gave many valuable and helpful suggestions to assist the electrical inspectors in making tests in the field without instruments which would indicate whether or not the sample of wire under consideration was in accordance with the specifications of the Code, and what the Laboratory and manufacturers' labels indicated it to be.

His talk elicited many questions from the members, which were indicative of the attention with which his remarks were received, and the resulting discussion brought out many interesting points. The great value of the paper was in bringing home to the members present the intimate relationship between the Underwriters' Laboratories and the electrical inspectors in the field, and how the work of each was helpful and necessary to the other. Mr. Bartlett was tendered a vote of thanks.

After this an animated discussion concerning the best method of grounding wireless-telegraph apparatus was engaged in at the request of the President.

The President then called the attention of the members to the fact that at times answers to the questions in the Association's columns in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN appeared without any explanation or reason for the answer. He deplored the use of the words "yes" or "no" as an answer and thought that some explanation would help the person who had asked the question as to why the member of the Executive Committee gave such an answer. In view of this the following resolution was unanimously passed:

"*Resolved:* That the Secretary be and hereby is directed to request the National Secretary to direct his best efforts toward securing explanatory answers which are to appear in the Question Box of the National Association, these answeres to have more than the words 'yes' or 'no.'"

After lunch at the City Club the members proceeded to the Dutch Point Station of the Hartford Electric Light Company, where as the guests

of Fred C. Wilbraham they spent the afternoon and adjourned, all feeling that they had spent a most profitable day.

[Attest] R. G. Forsyth,
Secretary.

The Secretary earnestly hopes that the other sections are holding as interesting and profitable meetings as the Western New England, and again desires to call the section secretaries to the provision in the National Constitution referring to the forwarding of reports of meetings. He also *recommends particularly* to the members of the Executive Committee consideration of the resolution of the section noted above, it being exactly in line with his own desires.

The regular meeting of the Eastern Massachusetts Section was held on April 16 at the office of Commissioner Cole in Boston. Considerable business dealing particularly with the nitrogen lamp was discussed, but the meeting was held too late for the report to be gotten ready for this issue, and it must lie over until later.

Public Service Commissions

Conducted by William J. Norton

CALIFORNIA.

The Pacific Telephone & Telegraph Company. The Commission has issued an order authorizing a compromise between the Pacific Company and the city of Oakland which grants the company the right to operate under a franchise it purchased in 1912 from the Bay Cities Home Telephone Company. The city dismissed its suit against the Bay Cities Company's bondsmen and is to receive 2 per cent of the gross annual receipts of the Pacific Company. In its suit the city of Oakland sought $500,000 damages on the ground that the transference of the franchise was in violation of the agreement by which it was originally issued. The Pacific Company will add fourteen years to its franchise term by operating under the franchise authorized by the compromise and it is estimated that the city will receive approximately $1,500,000 a year of the company's revenue.

The Pacific Gas & Electric Company is authorized to sell $2,000,000 of its collateral trust notes at a price not less than $975 and accrued interest for each $1,000 note.

Certificate of Public Convenience and Necessity. The Commission rendered a decision denying the application of the Calistoga Electric Company for a rehearing in the matter of the extension of the Napa Valley Electric Company. The Napa Valley Company had been authorized to extend its electric distribution system in territory adjacent to the town of Calistoga and such extension was opposed by the Calistoga Company.

ILLINOIS.

Jurisdiction of Commission Over Contracts. In the case, Frank Porter vs. Louisville & Nashville Railroad Company, the Commission held that a contract between the parties is not a bar to the action of the Commission in the regulation of rates under the Public Utilities Law. According to agreement between the petitioner and the respondent railroad, the petitioner was to receive an annual pass or free transportation over all lines within the state of Illinois, covering a period from February 22, 1913, to December 31, 1916. The respondent notified him that although it is willing to do so it cannot issue free transportation to him for the reason that it is prohibited from so doing by the Public Utilities Law. The petitioner asked the Commission to order the railroad company to comply with its agreement and the petition was denied. The Commission says: "The intent of the Legislature in passage of this section of said Act (Section 37) evidently sought to prevent a public utility from receiving either greater or less or different compensation from any corporation or person, than that offered by its schedule to any other corporation or person.

"If petitioner could lawfully claim that he is entitled to transportation by reason of his contract with the railroad company then this Commission would be compelled to recognize the contractual relations of parties, made with public utilities with reference to service. Such a view of the law would defeat one of the purposes for which the Act was passed.

"It is urged in support of the petition that a refusal by this Commission to recognize the validity of, and to be governed by the terms of the contract entered into by the petitioner and the railroad company would be violative of the provisions of both the Federal and State Constitutions relating to existing contracts. This Commission does not agree with such contentions.

"We hold that the said contract so entered into by the petitioner and the railway company cannot prevail over the inherent power of the state to exercise its authority through a public utility commission to fix and determine reasonable and just rates for such service. To hold otherwise would allow a public utility to contract with third parties for service or commodities in such a manner as to defeat the purpose of the law and nullify the power of the state to regulate its public utilities.

"Contracts such as the one under consideration here, are presumed to have been made in view of the possible exercise by the state of its higher power through legislative enactment for the regulation and control of public utilities."

Grafton Telephone Company. The Commission authorized the sale of the property of the telephone company at Grafton for $6,000, the price agreed upon by the parties to the sale.

The Western Union Gas & Electric Company, furnishing gas and electric service in a number of municipalities in Illinois, asked for authority to extend the discount period for the payment of gas and electric bills by municipalities and the United States Government. The Commission granted the application. Because of the systems of accounting and the various dates upon which they are enabled to pay bills, municipalities and the United States Government were unable to pay the bills for gas and electricity within the discount period fixed in the company's schedules.

Financial Statement. According to a recent statement the revenues of the new state utilities commission from its organization on the first of the year to April 25, total $71,418.66. The total expenses of the Commission to May 1, are about $4,800. Deducting all expenses the net receipts up to the first of the month are $23,722.93 which amount may be turned into the state treasury over and above what the Commission has cost the state.

INDIANA.

Indianapolis Street Lighting Rates. The Merchants Heat & Light Company and the Indianapolis Light & Heat

Company have submitted propositions to the city in an attempt to secure the proposed ten-year contract, beginning April 1, 1915, for electric street lighting. The Merchants Company has offered rates considerably lower than the present rates of the Indianapolis Company and the Commission may be asked to determine the reasonableness of the rates to prevent discrimination in favor of the city as against the domestic consumers.

NEW YORK.

Commissioner John E. Eustis has resumed his work as member of the Public Service Commission, First District. Upon the expiration of his term as commissioner, Mr. Eustis went on a vacation trip from which he has just returned. It was understood when he left that another appointment would be made to fill his place on the Commission. George M. S. Shulz, appointed by the Governor and confirmed by the Senate, has not qualified. It has been held by the counsel of the Commission that the Public Service Commission law is so framed that there is no vacancy on the board through the expiration of the term for which one of its members is appointed, as he holds over until he is displaced by the qualification of his successor. It is expected now that, when the special session of the Legislature convenes on May 4, the Governor will send in a new nomination to the Senate. The return of Commissioner Eustis is likely to break a deadlock which has existed in the Commission since March 3.

VERMONT.

The Reduced Rate Toll Charge, when a party is called, but not secured, is to be abolished in Vermont May 1. The announcement was made by the New England Telephone & Telegraph Company after consulation with the Vermont Commission. This charge had been discontinued in Maine, New Hampshire and Massachusetts. It was conceded by both the Massachusetts Public Service Commission and the Vermont Commission that such a charge was a reasonable one for the service rendered. They nevertheless urged its discontinuance on the ground that it was certain to be a continual source of misunderstanding on the part of the public, partly because the reason for it was not appreciated, and partly because no other company operating in this territory or in adjoining territory made such a charge.

WISCONSIN.

Certificate of Convenience and Necessity. The Commission denied the application of the Wisconsin Telephone Company for a certificate of convenience and necessity to build an extension of its lines into the town of Rock, Rock County, on the ground that the subscriber to be served could receive adequate service, except for long-distance service, from the Rock County Telephone Company. The Commission states that it will take up the matter of a physical connection between the Wisconsin Telephone Company and the Rock County Telephone Company at a later date.

Equitable Electric Light Company. A supplementary order has been issued modifying the Commission's original order in the case of H. G. Douglas et al. vs. Equitable Electric Light Company, of Lake Geneva. Objections were made as to the primary rate for lighting service, the character of the schedule for power and the high rate for street lighting. The supplementary order defines the active load for lighting consumers more specifically and also reduces the charge for excess current for this class of users. The power schedule is changed from a service and energy rate to a schedule similar to the Commission's customary lighting schedule. The street-lighting rates were reduced by contract between the parties and were not considered in the decision. The order also provides for an electric heating rate designed to encourage the sale of current for this purpose.

Stock and Bond Issues. The Commission authorized the Rock County Telephone Company to issue 250 shares of stock of par value $100, the proceeds to be used for the completion of the company's aerial cable system and a portion of its central-office equipment. The Commission also authorized the Caledonia Farmers Telephone Company to issue one share of stock of par value $30, the proceeds to be used for extensions and additions to the plant. The application of the Belmont Pleasant View Telephone Company for authority to issue $400 of capital stock was granted. The Pilsen Telephone Company was authorized to issue $175 of stock.

The Wild Rose Telephone Company secured permission to issue stock to the extent of $850 and $3,150. Both issues were authorized for the purpose of making extensions to the company's plants.

Utility Work of Bureau of Standards.

The Bureau of Standards has asked Congress for an appropriation of $100,000 to be used in the investigation of problems in connection with public utilities. The Bureau desires this appropriation to enable it to conduct the necessary investigations to determine proper standards of service for public utilities, to be used as a basis of regulation by states and municipalities. The House Committee on Appropriations has allowed the Bureau $25,000 for this purpose.

Austin Dam and Power Plant Soon to be Placed in Operation.

The big dam which is being built across the Colorado River just above Austin, Tex., was expected to be completed about May 1. The City Water Power Company, of Hartford, Conn., was given the contract for constructing the dam and power plant according to the plans of Lamar Lyndon, the eminent engineer of New York City. By the terms of the city's contract, the dam builder is obligated to install electrical equipment capable of generating 6,000 horsepower of electrical energy; and guarantees that with the water of the lake standing 18 feet lower than the crest of the dam, two of the three generating units installed can be operated with an output of 3,300 horsepower continuously. The contractor agrees to operate the plant for 25 years, during which time he guarantees to deliver to the city 600,000 horsepower-hours of energy in every thirty-day period regardless of river conditions.

The power plant is built on the site of the one destroyed several years ago and makes use of the remaining portion of the old building. Three vertical turbines of 2,400-horsepower capacity each when operating under a head of sixty feet are connected to three 6,600-volt, three-phase, sixty-cycle alternators capable of delivering a total of 6,000 horsepower under these conditions. Two small direct-current generators supply the necessary exciting current. Five large penstocks of steel incased in concrete supply the water to the turbines.

The dam is of hollow reinforced-concrete construction between 1,100 and 1,200 feet long, having a base nearly 100 feet thick and standing 65 feet above low-water level. When water begins to flow over the crest of the dam, the floodgates automatically open. These gates are 14 feet high on the part of the old dam utilized and five feet high on the new structure, thus throwing the maximum strain against the stronger part of the dam. Owing to the hollow construction of the dam, an interior passage is provided more than half way across the river. By means of this passage and the footpath on top of the structure, the keeper of the works will have the entire dam under his observation.

The rapidity with which Jerusalem is growing owing to the return of the Jews in great number to the home of their ancestors, has necessitated the introduction of modern electrical improvements. Four separate tramway routes are to be built, all starting from the Jaffa gate.

Flame Carbon Arc Lamps.

At the meeting of the Pittsburgh Section of the Illuminating Engineering Society on April 17, C. E. Stephens presented a paper on "The Development of Flame Carbon Arc Lamps," and F. Alex. McDermott on "The Firefly and Other Luminous Organisms." The main papers were preceded by a discussion of the history and theory of arc lamps by R. B. Chillas.

Mr. Stephens introduced his subject by calling attention to the improvements that have been made in recent years in the appearance of lamp units, the increased use of ornamental poles, and the efforts to reduce the number of poles on the streets by using combination poles for lamp, trolley and auxiliary apparatus.

Flame arc lamps may be classified as open-flame carbon arcs and inclosed-flame carbon arcs. In the former the arc is maintained between mineralized carbons, inclined together at an angle of approximately 25 degrees, with the arc chamber thoroughly ventilated. Because of the free oxidation the carbons are consumed quite rapidly, the life being 16 to 20 hours, depending on their length. The method of forming the arc between inclined carbons necessitates the use of carbons of small diameter to insure that the ends will burn evenly; hence to secure a reasonable life, carbons of comparatively great length are required. The long, small-diameter carbon is necessarily expensive.

The open-flame carbon arc lamp is useful only where large quantities of light are required, outdoors, and in some industrial establishments where the areas to be lighted are great and mounting heights high. The light efficiency is high, but the distribution is such that the maximum intensity is directly under the lamp, and this makes the lamp unsuitable for producing a uniform illumination over large areas. The mechanism is complicated and the lamp requires frequent attention.

In order to secure a long-burning open-flame carbon arc lamp, various magazine types have been devised. In general, these lamps have been commercially unsuccessful because the quantity of carbon consumed was approximately the same, the only saving being in the labor of trimming. Also the magazine added to the complexity of the mechanism.

Early attempts to lengthen the carbon life by restricting the air supply resulted in a heavy deposit of white powder over the glassware, which in a short time became so thick as to absorb practically all the light. The problem was so to dispose of the metallic fumes that the glassware would remain comparatively clean throughout an entire trim of carbons, which should be 100 to 125 hours. This is achieved in the modern lamps.

The inclosed-flame arc is maintained between mineralized carbons in an inclosure where the air supply is restricted. The carbon forms the conducting vapors, and the illuminosity of the arc depends on the quantity of the mineral salts vaporized. This vaporization must be uniform to produce a steady light. Practically all of the light emitted comes from the arc flame, and only a very small portion from the incandescent craters on the carbon ends. The carbons are vertical and superimposed, so that the arc flame is also vertical.

The diameter of the carbons is approximately seven-eighths inch and their length 14 inches. The rate of consumption is comparatively small, allowing a simple and rugged mechanism, which is a modification of the ordinary inclosed carbon arc mechanism, the difference being in the sneak feed and the focusing arc principle. In other words the carbons are fed into the arc simultaneously, at rates depending upon their relative consumptions, maintaining the arc in a fixed position, and they are fed gradually, instead of by steps. The fumes from the arc are deposited in a relatively cool condensing chamber above the globe.

The successful operation of the lamp is entirely dependent on the character of the carbons. The cored type have not proven successful and modern carbons are homogeneous, show an efficiency of 0.2 to 0.3 watt per mean lower hemispherical candlepower and a life of 100 to 125 hours. The maximum candlepower is from 10 to 30 degrees below the horizontal, making the lamp particularly adapted to the illumination of large areas. A particular advantage of the flame carbon lamp is that it is suitable for either direct or alternating-current circuits and for frequencies as low as 25 cycles.

The efficiency of the inclosed-flame carbon arc lamp is much better than that of the new nitrogen-filled tungsten lamps; moreover, it is susceptible of improvement, while the latter is near the theoretical limit of its efficiency. The efficiencies of the new tungsten lamps are given for clear glass globes, and when they are inclosed in suitable diffusing glassware the efficiency will be still lower. The tungsten lamp is undoubtedly desirable for series circuits in residential sections, and the gas-filled lamp will probably enlarge this field somewhat; but, in the opinion of Mr. Stephens, it will never compare favorably with the flame arc lamp for business streets, boulevards, parks, driveways, city squares, and other areas where there is any great amount of traffic and which require a high illumination intensity.

The new high-efficiency Mazda lamp is too new to predict its limiting field with any degree of accuracy. Its immediate effect will probably be to entirely wipe out all of the old inclosed carbon arcs; to extend the present field of the tungsten lamp; and to accelerate improvements in flame arc lamps of both the flame carbon and metallic flame types.

In his paper on the "Firefly," Professor McDermott reviewed the present state of knowledge of the production of light by living organisms, with special emphasis on the physical properties of the emitted light, and the chemical processes involved in its production. Although there still remain many points for future workers to clear up, it has been shown that the firefly expends all of the energy used in light production within the range of the visible spectrum, the maximum of the energy distribution curve falling near those wave-lengths having the greatest illuminating power. Infra-red, ultra-violet, and penetrating radiations are absent. The chemical processes involved are probably those of the oxidation of some physiologic substance; there is some evidence that this substance may be a nucleo-albumin. The watts-per-candle efficiency is in the neighborhood of 0.054. The illuminating efficiency is estimated at 90 to 96.5 per cent. The material may be dried out of contact with the air, without losing its power to produce light when moistened. The power to produce light is quite widely distributed among animal forms, and much less widely among plant forms. The fireflies do not appear to produce the substance as needed, but start life with a limited amount. The organs for the production of light vary greatly in structure in different groups of animals, and in some cases show very intricate structures. In the fireflies, the light is of a secondary sexual character; in other forms the usefulness varies.

G. M. Little, S. G. Hibben, G. W. Roosa, Alan Bright, M. C. Turpin, H. H. Magdsick, R. B. Chillas, C. E. Stephens and F. A. McDermott participated in the discussion of the two papers. The following points were brought out.

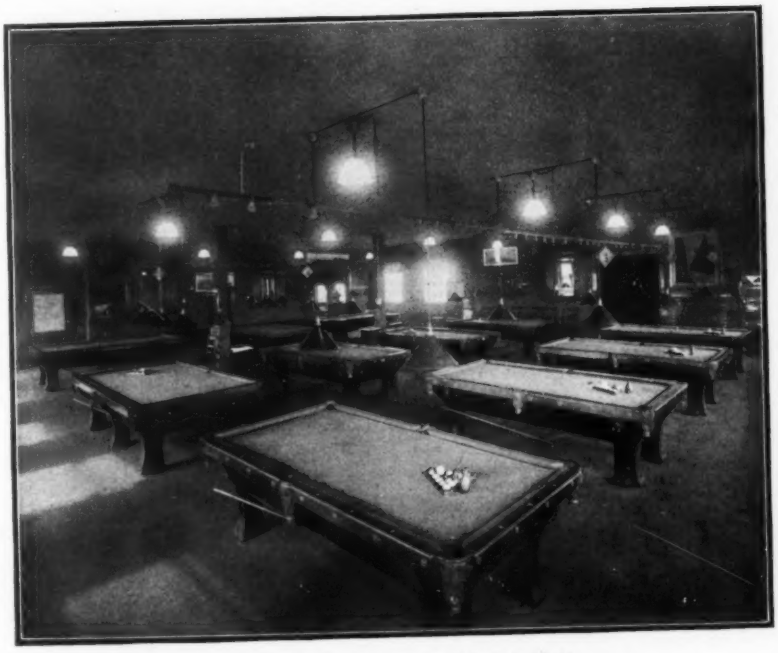
In addition to being rated with clear glass globes, the ratings of the gas-filled tungsten lamps are given in horizontal (in other words, maximum) candlepower values, while arc lamps are rated in mean spherical or mean hemispherical candlepower values. Failure to note this distinction will cause confusion in comparing values.

One of the improvements in flame arc carbons is the reduction of the

etching of the inner globe by the fumes. Most of the impregnating salts are fluorides, which will attack glass. Most substances which will prevent this action, reduce the efficiency of light production, but recently carbons have been produced in which the etching is eliminated without an objectionable reduction in efficiency.

A number of 25-cycle flame arc lamps are being used successfully, but their application must be carefully guarded. They are not satisfactory around rapidly moving objects such as flywheels, pulleys, etc., as they produce a flicker which, in addition to being objectionable, produces a false sense of position. They are being successfully used for general illumination of large areas which do not include rapidly moving machinery.

Lounging Room of Colorado Electric Club.



Pool and Billiard Room of Colorado Club.

The extension of the electrification of the New York, New Haven & Hartford Railroad to New Haven, Conn., is expected to be completed in June.

Colorado Electric Club in Permanent Quarters.

The Colorado Electric Club, of Denver, is now one of the leading commercial organizations of that city and is undoubtedly one of the strongest electrical clubs in the country. It recently consolidated with the Colorado Traffic Club and took over the quarters of the latter organization in the Chamber of Commerce Building. The combined membership numbers 1,510 and an aggressive campaign is being made to reach a membership of 2,000. It is thought that the Club will be successful in doing this in the course of a month or so.

The Colorado Electric Club has had remarkable success since its organization five years ago. During the first year of its life, it held an electric show which returned a dividend of 100 per cent on the stock of the company formed to hold the show. The following year another show was held, which was also a pronounced success. The Club is active in every movement that makes for the building of the city and state and will undoubtedly be a powerful factor in the development of the electrical industry in the Rocky Mountain states. Just now, plans are being made to create a large advertising fund which will be used to advertise the advantages of Colorado and a special effort will be made to assist in the colonization of the farm lands. The directors of the Club believe that the settlement of Colorado's lands should receive the concentrated attention of all the commercial organizations in the state and they hope to crystallize a sentiment which will do much towards active colonization of Colorado's large expanses.

The Club's new quarters are spacious and comfortable and afford all the advantages of the modern club. There is a splendid restaurant and the members are able to meet every day in the year. Certainly nothing has been done to knit more closely the electrical interests of the mountain states than the permanent establishment of headquarters for the Colorado Electric Club.

The following are the officers and directors: W. F. Cozad, president; L. M. Cargo, first vice-president; W. H. McAloney, second vice-president; C. F. Oehlmann, secretary and treasurer; W. J. Barker, Irving Hale, Benedict Shubart, Joseph F. Reardon, Harry C. Biglin, John J. Cooper and Herman A. Giese, directors.

The International Electrotechnical Commission will recommend to the International Electrical Congress, which is to convene at San Francisco in 1915, the adoption of the name "siemens" for the unit of conductance.

Allis-Chalmers Fiscal Report.

The Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has issued its first annual report covering the period from April 16 to December 31, 1913. For this period of eight and one-half months the net profits were $755,-124. The income account follows:

Sales billed		$11,127,621
Cost, including depreciation and development expenditures		9,503,473
Factory profit		$1,624,148
Deduct—Selling, publicity, administration and general expenses.		1,017,552
Net manufacturing profit		$606,596
Other income—		
Interest on investments, bank balances, discounts, etc.		148,528
Net profit		$755,124

President Otto H. Falk, in his remarks to stockholders, says:

"The plants engaged in manufacturing operations are in good condition at present and of ample capacity to handle a much larger volume of business, and with the changes and economies that have been effected in the various departments throughout the organization there is every prospect, with the revival of business, that the Allis-Chalmers Manufacturing Company will earn substantial profits.

"An agreement has been consummated whereby the preferred stock of the Bullock Electric Manufacturing Company is to be exchanged for first-mortgage six-per-cent bonds of that company at the rate of $80 in bonds for $100 of preferred stock and the payment of the accrued and past due dividends on preferred stock of the Bullock Electric Manufacturing Company to January 1, 1914, amounting to seven and one-half per cent. After this exchange is completed the Allis-Chalmers Manufacturing Company, which now owns all the common stock, except directors' qualifying shares, will be the sole stockholder of the Bullock Electric Manufacturing Company. The Allis-Chalmers Manufacturing Company has agreed with the holders of the preferred stock to purchase at any time on or before February 1, 1915, all or any part of such bonds as may be tendered at 95 per cent and accrued interest.

"The board of directors carefully considered the question of the declaration of a dividend on the preferred stock out of the surplus profits of $755,124, but in view of the present depressed conditions concluded to adopt the conservative policy and defer taking action thereon until such time as current profits and future prospects would justify a reasonable assurance of the continuance of dividend payments."

Engineer Utilizes Abandoned Telegraph Wire for Wireless Antenna.

One of the engineers of the J. G. White Engineering Corporation, a part of whose work is the erection of the great transoceanic stations for the Marconi Company, recently made an interesting experiment in his apartment in New York. Finding an abandoned telegraph wire fastened outside his window, he connected a tuning coil, a crystal detector, and an ordinary telephone receiver to the wire. He was surprised to hear such stations as Washington, Wellfleet, Cape Cod, etc.

Annual Report of the General Electric Company.

The twenty-second annual report of the General Electric Company for the year ending December 31, 1913, has been published as of date April 20 by order of the board of directors and under the hand of C. A. Coffin, chairman of the board.

In 1913 the business of the company exceeded in volume the record of any previous year.

The value of orders received was $111,819,142.00; the amount of sales billed was $106,477,438.76; the net results were: Profits from sales, $10,-269,605.45; income from other sources, $3,796,184.43, a total of $14,065,789.88; less interest and discount on debentures and notes payable, $1,007,910.69; dividends paid, $8,149,204.55; carried to surplus account, $4,908,674.64.

More than 600,000 orders were received, and the tendency toward an increase in the number of orders and a reduction of their average value continued during the past year. The number of employees engaged in factories, offices and subsidiary companies on December 31 exceeding 65,000. During the year additional manufacturing floor space to the amount of 1,740,000 square feet was provided, making a total manufacturing floor space available at the end of 1913 of over 13,900,-000 square feet. Quarterly dividends at the rate of eight per cent per annum were paid during the year. The condensed balance sheet is as follows:

Condensed Balance Sheet.

ASSETS.

Patents, franchises and good-will			$ 1.00
Cash			14,844,210.14
Stocks and bonds		$25,964,316.94	
Notes and accounts receivable		26,210,458.94	
Due from subsidiary companies		6,817,563.44	
Installation work in progress		2,012,514.35	
		$61,004,853.67	
Merchandise inventories:			
At factories	$31,697,055.53		
At district offices, in transit, etc.	4,010,538.45		
Consignments	2,083,144.79		
		37,790,738.77	
			98,795,592.44
Manufacturing plants (including all lands, buildings and machinery)		$29,427,168.29	
Real estate, buildings, warehouses, etc. (other than manufacturing plants)		1,058,386.49	
Furniture and appliances (other than in factories)		2.00	
			30,485,556.78
			$144,125,360.36

LIABILITIES.

Debenture bonds:			
5% series of 1892		$ 16,000.00	
3½% series of 1902		2,047,000.00	
5% series of 1907		88,500.00	
5% series of 1912		10,000,000.00	
			$12,151,500.00
Notes payable, due April 16, 1914		$ 8,000,000.00	
Accounts payable		2,846,656.88	
Accrued taxes		302,133.88	
Advance payments on contracts		279,561.47	
Accrued interest on debentures		197,016.63	
Dividend payable January 15, 1914		2,027,472.00	
			13,652,840.86
Capital stock issued			101,381,200.00
Surplus:			
At January 1, 1913		$12,031,144.86	
Added during year		4,908,674.64	
			16,939,819.50
			$144,125,360.36

Electrical Opportunities in Central America.

The Central American republics are undoubtedly about to begin a period of great economic development in consequence of the opening of the Panama Canal. Commercial interests in Europe are already making preparations to make the most of the business opportunities about to be offered, and for this reason the British government has recently issued a Blue Book on the subject which contains much information which will be of value to American technical men, and of which the following is a condensation in so far as the electrical industries are concerned.

San Salvador, with a population of 60,000, the capital of the republic of the same name, does not yet possess any electric street railway, but there is now under consideration a proposition to electrify the existing lines, on which the cars are now being drawn by mules. The energy must be furnished by batteries. Within a short distance of the town are to be found water falls which would be sufficient to provide power for a generating station. There is in existence at the present moment a hydroelectric plant which sells current for public and private lighting; this company is doing well financially.

Tegucigalpa, the capital of Honduras, with a population of 35,000, and the neighboring town of Comayagua (12,-000) are both electrically lighted. The current, which is also sold for domestic lighting, is produced by a plant owned by the government.

Managua (35,000), the capital of

Nicaragua, has an electric lighting system for public and private service. The current is supplied by a power station in which steam engines are used; the boilers of the installation are heated by wood.

The electric plant at San Jose (40,000), Costa Rica, has been built by English capitalists. The company sells current for lighting and power; it also operates a street railway. Public lighting is furnished by a native company; in both cases the plants are run by water power.

Bogota (130,000), capital of Colombia, has a street railway system which is partly electrified. The power plant was until recently in the hands of Americans; it has now been taken over by the municipality. Current for lighting is furnished by a private native company. San Jose de Cucuta (10,000) and Medellin (60,000) are electrically lighted.

At Caracas (73,000), Venezuela, current for private and public lighting is supplied by an English company which has quite recently acquired the concession from a native concern. Current for street railways is produced by a hydroelectric generating plant owned by a local company. The street railway has also a reserve plant in which the power is produced by a Diesel engine. There is now being built in the neighborhood of the town another hydroelectric plant owned by an English company.

The republic of Guatemala, with a population of two millions, imports from Germany the largest part of the electrical material used; the value of this is about $50,000 a year. This is accounted for by the fact that the power and lighting companies are controlled by German capitalists. One of the conditions imposed upon consumers of light and power is that they must buy their material at the power plant. It is proposed to electrify the street railway system in the capital, which belongs to an American company. The prospects for electrical industries are favorable, as the country possesses abundant water power. But there is considerable difficulty in complying with the customs regulations, and quarrels between importers and the customs officials are of frequent occurrence.

Electrical importations into San Salvador are divided between Germany and the United States. The government buys its telegraphic material, however, from commercial houses in the United States.

In Honduras the influence of the United States predominates. Electrical imports amount to about $25,000 a year. Germany gets but a small part of this. The mining industry, which is rapidly developing, promises an important market for electrical material. In Nicaragua also electrical importations are mostly from the United States.

In Costa Rica the importations of electrotechnical materials have rapidly increased in the last few years; the annual value now exceeds $100,000. Three-quarters of this comes from the United States, the other quarter principally from Germany.

Importations into Panama are divided between England and the United States, the latter getting 54 per cent of the total, which amounts to $75,000 a year. During the last few years, however, English influence has increased. It is said that some of the goods sold as of English make are in reality German.

The importations of Colombia are divided between the United States and Germany. Business in electrical lines is small, amounting to only $50,000 a year. But the prospects are good, and the Colombian market is worthy of attention from American electrical manufacturers.

In Venezuela the electrical industries have recently experienced a boom, imports suddenly rising from $25,000 to $75,000 a year. Four-fifths of this comes from the United States, Germany and Italy dividing the remainder. Canada has recently entered the market, which is due to the fact that some of the mines have lately gone into the hands of Canadian capitalists.

Besides the English company above mentioned in Caracas, there has recently been started by French capitalists a local enterprise which furnishes energy to the town and suburbs. This company now has three hydroelectric stations running on the Guaira River, and generating about 25,000 horsepower. These plants furnish current for street railway and industrial purposes, for which there is an increasing demand, as a number of manufacturing concerns are beginning to make use of electric power.

The commercial houses of Europe are thoroughly alive to coming opportunities in this region, and there seems no reason why a considerable amount of the business which will shortly be developed should not come to the United States.

Week-End Cablegrams to Germany for $2.00.

The Commercial Cable Company announces that week-end cablegrams for delivery on Mondays may now be sent by the German Atlantic cables to Germany at reduced rates. The charges from New York City will be $2.00 for 25 words or less and 8 cents a word for words in excess of 25.

DECORATIVE LIGHTING OF THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.[1]

By J. W. Gosling.[2]

The searchlight has been used at most expositions to some degree, but as it was somewhat of a novelty at Chicago, its use was naturally crude. At that time there had not been developed the methods of today in spreading light over large surfaces, nor had they at that time perfected the use of color screens in connection with the searchlights.

By the double use of the searchlight, decidedly pleasing effect is obtained. Using two rays of unequal power from different angles, it is possible to give a definite idea of the depths of an object and bring out clearly any decoration or modelling it may have. What we do is really to illuminate the shadows. By the introduction of color into either the weaker ray, which is of course the shadow, or both, some weirdly beautiful results are obtained.

In the earlier expositions the lighting of streets, roads and open spaces has generally been treated much as we would light an ordinary thoroughfare. The illumination of the roadway was cared for mainly by that light which flooded out from the lighted buildings, thus bringing all sources of light within the range of vision of the observer. Where maximum illumination is required, it is necessary to have the source either wholly or partly exposed and in consequence there has been developed much efficient glassware which will subdue the very brilliant spot at the source and diffuse the light through a globe where the same quantity of light covers such a large area that it is not objectionable to the eye.

The development of lighting apparatus of all kinds has been so great that we will be able to obtain effects which have never before been seen, at least on such a grand and interesting scale as we will be enabled to use them.

Searchlights or projectors with wide-angle doors have a value in the lighting of large areas which has not heretofore been applied. There will be 375 arc projectors in use in the exposition, varying in size from 13 to 30 inches, for general illumination, for the illumination of sculpture, towers, streamers, panels and flags, while in the great battery composing the scintillator there will be 48 36-inch projectors.

The lighting of the exposition is divided into various types or classes, viz: interior lighting, court lighting, light-

1 Portion of an address delivered before the San Francisco Architectural Club, March 24.

2 Designer for the Illuminating Engineering Department of the Exposition.

ing of the setting of the Fine Arts Building, South Gardens, boulevards and roads, lighting of sculpture, festive lighting, lighting of jewels and spectacular lighting.

All windows in the exposition will be equipped with lamps which are intended to cast an even, bright, warm illumination through them, so that when the exposition is seen from the hills it will have a generally gay, pleasing and hospitable aspect, much resembling a great building during a gala occasion. In many cases the lamps will be colored.

Festival Hall, besides its great auditorium, contains a number of small conference rooms, halls and passages of odd form. Most of these conference rooms and halls have low ceilings and are lighted by semidirect lighting units, which are made of plaster and have a glass bowl set in them for direct diffusion of the light. The entrance halls and foyer will be lighted by large suspended fixtures composed of a dish of leaded glass, something in the form of the Greek amphora. It is intended that these fixtures will give warm, even illumination throughout the entrances. The vestibules will be equipped with a rather ornate lantern similar to that which will light the colonnades of the Court of Flowers. The auditorium is lighted by both indirect and direct light. Indirect illumination is obtained by the use of searchlights which are set in a well under the center of the room, the light being sent upwards through a diffusing plate on the well head. This well head is about four feet in diameter, and on a level with the backs of the seats. It is estimated that the twelve 18-inch projectors used for this work will give a general even illumination upon the interior of the dome, and reflecting the light downward will give an illumination of about 1.5 foot-candles at the floor.

In order to offset any effect of the flatness or coldness generally derived from indirect light, there will be suspended six large ornamental-ball-type fixtures in the arches over the balcony as well as 12 well fixtures placed around the corridors at the rear of the balcony. These fixtures will be composed of glass work which will give off a warm, soft, mellow light and will be kept out of the direct range of vision of anyone watching the stage, although none of them is so intense or brilliant as to tire the eyes.

The style of architecture of the California Building has been the means of developing a number of lighting devices which will be somewhat out of the ordinary, the principal ones of these being the great ring of candles in the foyer, the spheres of light which will illuminate the body of the ball room, the method of lighting the dining room of the president of the exposition and the lanterns which will glow at all the principal entrances. The arcades are lighted by small lanterns and the forecourt by many tiny lanterns strung through and about the trees and hedges. The oval entrance stairway will have newels composed of three figures, each bearing luminous glass balls. In the president's dining room there is a ceiling panel about 12 feet square, above which there is a skylight; suspended beneath this skylight will be a silk shawl or curtain through which will pass the light for illuminating the room.

The Court of the Universe, being the most important of the courts and one of odd form and dimensions, presents some very unique problems in illumination. The main source of light will be placed in the two large fountains at either end of the sunken garden. The part giving the light is in the form of a column in the center of each fountain. The columns are of heavy diffusing glass, about 38 feet high and 5 feet in diameter, each containing ninety-six 2,500-candlepower nitrogen lamps. It is calculated that there will be a generally even light on the face of the peristyle of about 3 foot-candles.

In this court there are also a number of small sources of light, none of them intense, but being placed to accentuate the elliptical form of the sunken garden and act as a means of adding an appearance of festivity and brilliance to the court, to draw the eye from the brighter fountain light, and relieve the space between the fountain and the columns from any effect of monotony. On the back of each column set in the fluting will be three glass bowls, each containing a lamp, which will shed a warm light over the arcade and tend to wipe out any objectionable shadows which might be cast by the main lighting source.

It is in this court that we have the great ring of figures bearing stars of jewels. In the base of each figure is placed a projector, not visible from below, but casting a beam of light across the court and shining on the star of a figure on the opposite side. The north approach to this court will have a row on either side of the pool of single-unit standards of the new style of lamp, giving the colonnades the same color tone as the great court within.

The Court of the Four Seasons will have a light of a different color. By this is not meant that the color will be different in the sense that yellow is different from red, but in the sense that the light of the arc is quite different from that of the incandescent lamp. About the fountain in the center of the court, midway between it and the colonnade, will be ranged eight standards, each having two ornamental luminous arcs and the approach will also be equipped with this same standard. These standards will be so placed that the light of the arcs will fall full upon the building and be shielded on the side away from the building. The shields on these standards are in the form of decorative figures bearing garlands of flowers.

The Court of Abundance, with its unique architectural treatment, has suggested many lighting effects which will strike the visitor with surprise as he enters the court. The basin in the center has at one end of it a fountain which is in the form of a globe surrounded by figures, and so arranged that the upper half of the globe will remain exposed. The globe, though 18 feet in diameter, will be built of glass and contain a mechanical arrangement of light which will give the globe the effect of turning as the earth does upon its axis. Streams of water will pour upon and over it, while about the sides will issue steam in slowly rising whirls, giving the whole the effect of the earth turning in space. At the opposite end of the pool and a part of the sculptural composition will be the sun, setting at the water's edge. The sun will be formed of a disk of plate glass about six feet in diameter, and have arranged behind it a mass of small incandescent projectors driving a powerful light upon the earth at the further end of the pool. By the use of colored shutters the sun will be given that effect of tremulous movement it sometimes has as it sinks through the denser atmosphere close to the horizon.

At the end of the pool and flanking the fountain of the earth, will be two great sunbursts of incandescent lamps. These are, in form, very much like a snow crystal and will face south, sending a warm light through the court, as the lamps, of which there are 435 in each burst, will be colored in all tints of yellow and orange.

Gas flambeaux are to be placed at intervals about the pool and will tend to break up that steady evenness of the electric light, as the flames will wave in the breeze. To further give interest to the illumination by gas, into the gas flames will be occasionally introduced barium, sodium, strontium, and other salts which will cause the gas to flare up in variegated colors.

Steam is employed in connection with the lighting of this court, for there will be a number of caldrons which will boil and give forth a wavering mist of color.

The cloisters surrounding the court are lighted by small lanterns, as well as the rays of searchlights placed above the cornice lines. These searchlights will be fitted with wide-angle doors, flooding the cascades with radiance.

The north approach to the Court of Abundance will be lighted by four of the same sunbursts as used in the inner court and also have many gas flambeaux, cloister lanterns and steam caldrons.

Quiet, mysterious and peaceful will be the lighting effects of the Palace of Fine Arts and its setting. An effect of moonlight will be striven for to cover the lake, shrubbery and trees. Enough light will be centered upon the rotunda so that it may be seen in soft reflection in the water surrounding it. No light will be visible here except an occasional firefly in the trees. This will be the spot to rest the eyes after viewing the brilliance of the scintillator display.

The South Gardens will be illuminated in general by luminous arc standards. Two rows of these, 55 feet high and bearing nine lights each will flank the central fountain, all facing the tower. The reverse side of the lamps will be shielded so that an observer entering the grounds through the main entrance will not be compelled to look at a single powerful light source.

It is in the gardens where we will be able to show to the best effect all the efforts at festive lighting. Down the long avenues of palms strung from tree to tree will be the Mission bells, small globes containing low-candlepower lamps and made in the form of little bells and in an endless variety of colors. In the trees will be placed oranges and the ever useful fireflies. Swaying in the breeze, as the trees will do, the chain of lights, all soft and harmonious in color, will move gently and quietly.

The Foreign Concessions streets will be lighted mainly by high-pressure gas, the design of the standards being similar to that in use in the North Garden.

Visit of the New York Electrical Society to the Bush Terminal at Brooklyn.

More than 100 members of the New York Electrical Society visited the Bush Terminal in Brooklyn, N. Y., on April 22. They were received by a committee consisting of T. I. Jones, of the Brooklyn Edison Company, chairman; F. C. Farnsworth, A. LeBlanc, W. L. Sturges, superintendent, and R. E. Ireton, educational director of the Bush Terminal Company. The delegation was taken to the Aid Society's rooms, where the meeting was called to order by President H. H. Barnes, Jr., who outlined briefly what the delegation was going to see and introduced Mr. Ireton.

Wireless Towers on Bush Terminal Buildings.

Mr. Ireton reviewed succinctly the operations and facilities of the terminal, preparing the visitors, in a measure, for the many interesting things which later were shown them, and dwelling particularly upon the plant's electrical equipment. Mr. Ireton described briefly, among other things, the equipment for handling freight shipments; the wireless on the roof of one of the factory buildings; the automatic sprinkler system installed in each of the terminal's ten factory buildings, 130 warehouses and 7 piers; the electric battery crane trucks, which serve both for lifting and hauling; the 114 electric elevators throughout the entire plant, and the numerous electric cranes and other hoisting apparatus. He also called attention to the ability of the plant to supply its tenants with live steam, gas, water and electric current for use in their operations, stating, in this connection, that 16,000 horsepower was supplied by the plant. He further emphasized the fireproof character of the buildings at the terminal and the additional protection afforded by the automatic sprinkler system, which cost $1,000,000 to install and comprises 150 miles of fire-alarm wiring, 126,000 sprinkler heads and 220 miles of piping throughout the factory buildings, warehouses and piers. He also pointed out the economy enjoyed by Bush tenants through the terminal's methods of handling all rail shipments, incoming or outgoing. These are floated between the terminal's docks and the several trunk-line railroad terminals, in standard railroad freight cars, which are hauled to or from a tenant's building at the terminal by electric locomotives.

T. I. Jones also addressed the meeting and gave some very interesting data of the service supplied by the Brooklyn Edison Company to the terminal.

An object of particular interest to the delegation in its tour of inspection was the new two-story pier, recently constructed to prepare for the increase in trade expected to follow the Panama Canal's operation. This huge dock is 1,450 feet in length, 270 feet in width and over 50 feet in height. Its two floors comprise an area of 15 acres—greater than any pier existing elsewhere. Six large ocean-going vessels may be accommodated at this pier and they may load and unload simultaneously. The American-Hawaiian Line which has leased this pier, expects to handle 1,500,000 tons of freight annually at the pier. The enormous range of giant warehouses along the bulkhead and the completely equipped railroad yard of the plant were other features inspected by the visitors.

Electric Club of Chicago.

At the Electric Club luncheon and meeting held at the Hotel Sherman, Chicago, on April 23, over 400 members and guests were present to listen to an illustrated address by Maj. M. C. L. Funkhouser, second deputy superintendent of police of the city of Chicago. This address dealt with observations that have been made by the speaker in connection with vice conditions in the second largest American city, particularly on the regulation that had become necessary of dance halls and of motion-picture shows.

New Electrical and Mechanical Appliances

New Two-Circuit Porcelain Pendent Switch.

A new all-porcelain two-circuit pendent switch has been added to the specialty line of the Cutler-Hammer Manufacturing Company, Milwaukee, Wis. This switch, which is really two switches in one, permits the control of two circuits, two groups of lamps, lamps and a fan, or other combinations from one point. The lamps of a large cluster or chandelier can be divided into two groups, each operated independently and controlled by this two-circuit switch. The two operating mechanisms used are of the same type as employed in the brass-shell two-circuit pendent and other C-H switches. The action is positive and snappy, and the switch is easy to install. The removal of one screw separates the

Two-Circuit Switch.

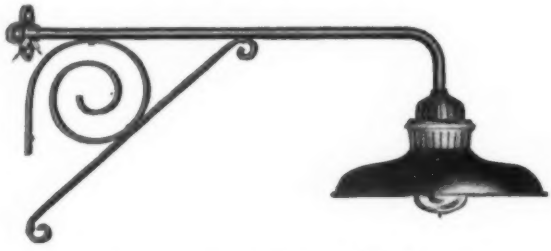
casing halves and exposes the three terminal screws at the top to which the ends of the three-conductor cord are secured. This switch has been approved by the Underwriters' Laboratories and has the following rating: 6 amperes, 125 volts; 3 amperes, 250 volts.

New Outdoor Fixtures for Nitrogen-Filled Lamps.

Anticipating the still greater use of incandescent lamps for street illumination due to the new high-efficiency nitrogen-filled lamps, the Line Material Company, South Milwaukee, Wis., has completed a new line of fixtures for use especially with these new units. These fixtures are made in a number of styles, for bracket support either plain and ornamental, for rope or span suspension, besides a simple street post type.

The bracket and suspension types have a large porcelain casing which makes unnecessary an extra insulator whether used on multiple or series circuits. The most practical feature is probably the new universal series socket which is made in one piece. It can be readily adjusted up or down so that the same fixture and reflector can be used with lamps of different size and thus provide for practically any installation.

The provision for moving the socket up and down makes it possible to place the lamp in the proper position in relation to the reflector and allow the use of a one-piece reflector, which is rigidly attached to the casing so that it cannot fall off under any condition. One fixture therefore can be used with lamps of various sizes and this decreases the amount



Bracket Fixture for Nitrogen Street Lamp.

of stock necessary to carry. The bowl-shaped reflector used with the fixture is made either with porcelain enamel reflecting surface or with Ky-ce-lain, a surface recently developed by the Line Material Company. The span type of reflector has a self-locking cable grip to prevent the fixture from sliding along the rope. The new street post is designed to take up small sidewalk space and the price is low enough to make street post lighting not prohibitive in cost.

Largest Hydraulic Valves in the World to be Motor Driven.

The electrically driven gate valves which have been constructed for the Niagara Falls hydroelectric plant of the Ontario Power Company are said to be the largest in the world. Each of these valves was designed to control the water supply to a hydraulic turbine developing 12,000 horsepower, coupled to a three-phase alternating-current generator. They are of the Chapman type. The width of the valve opening is nine feet and the weight of each valve 130,000 pounds. The overall width and height of these valves are 11 and 30 feet, respectively, the thickness over the flanges being 6 feet 8 inches.

Post for Nitrogen Lamp.

Each gate weighs more than 275 tons and is under a pressure of 60 pounds per square inch. A 14-inch bypass is utilized to relieve the pressure on operating the valve.

One 15-horsepower alternating-current motor is used to operate each valve, it taking about three minutes to completely shut or open the same. It is stated that the motor cannot restart in the wrong direction on account of the use of automatic switches at the end of the gate travel. An electromagnetic brake and means for reversing the motor when the valve is partly open are also provided.

Benjamin Fixtures for Nitrogen-Filled Tungsten Lamps.

The development of the nitrogen-filled tungsten lamp has created a demand for special fixtures designed particularly to suit the requirements of this highly efficient lamp. Of these requirements the principal ones call for ventilation of the globe, reflector or hood of the fixture and a design that will provide effective screening of the bare lamp or diffusion of its rays to prevent annoying glare due to the very high intrinsic brilliancy of the concentrated filament; reflection of the light into useful directions, while not imperative, is usually also provided in fixtures for these lamps.

Fig. 1.

A study of these requirements by the engineers and designers of the Benjamin Electric Manufacturing Company, Chicago, Ill., has brought about the development of a special line of fixtures suitable particularly for the high-power multiple nitrogen lamps. A few of these fixtures are illustrated herewith. Fig. 1 is a simple fixture made for either indoor or outdoor use. It includes a 12 by 18-inch alabaster diffusing globe with a ventilating opening at the bottom. A mogul base socket with lamp grip is provided. The hood and globe holder are arranged to protect the lamp from rain or snow, if used outdoors. In this case the hood and holder are furnished in copper with oxidized copper finish. For indoor use the holder and hood are of brass with brushed brass finish.

Fig. 2.

For industrial establishments and similar installations, fixtures of the types shown in Figs. 2 and 3 are made. The former has an enameled-steel reflector of the broad and relatively shallow type and finished outside in blue-black. The reflector gives a good light distribution and is deep enough to hide the filament from horizontal lines of vision, if the fixtures are hung low. Reflectors are made 18 and 20 inches in diameter. Fig. 3 shows a fixture with deeper bowl reflector. This is usually white enameled inside and outside with a blue bead. The hood is well ventilated. Reflector diameters are 13 and 15 inches.

For stores, corridors, etc., a neat fixture is that shown in Fig. 4. The body of this fixture is practically the same as the fixture shown in Fig. 1, but is arranged for chain suspension, the distance between the top of the hood and ceiling being 13 inches. The standard finished is brushed brass.

A new type of indirect fixture is shown in Fig. 5. The reflector is 20 inches in diameter and has a fluted surface which eliminates showing on the ceiling shadows of the suspension chains. The reflector shape and lamp suspension are such as to give a minimum of bulb absorption. If 400 or 500-watt lamps are to be used, the reflector can be raised a little over two inches. This makes a very efficient indirect unit.

Fig. 3.

New Type Railway Motors for Pittsburgh Traction System.

In connection with its new equipment of low-floor cars, the Pittsburgh Railways Company will install 100 motor equipments, consisting of four motors each, the design of which embodies some novel and interesting features. The motors will be known as GE-247; they are of the box-frame, commutating-pole type, and have a nominal rating of 30 horsepower at 500 volts. The motor equipments are being designed and built by the General Electric Company, Schenectady, N. Y.

The new cars will possess a number of unusual features, although they follow the principles developed in the original low-floor cars. They will be so constructed that a marked reduction in weight will be obtained. Complete with double-end control and couplers at each end, they weigh but 36,000 pounds. The most important innovations are the relatively small motors and wheels. The motors are, however, ample for the service on account of the light weight of the cars. The wheels are only 24 inches in diameter and permit the car floor to be kept down to a point which, in the center of the car, is but approximately two feet above the rail.

Fig. 4.

Payment is collected on entering as usual. A distinctive point of the design is the provision of a front auxiliary exit door in addition to the center doors. Either or both of the center doors may be used for entrance or exit, the file of passengers being guided in each instance by the conductor. A ramp in the floor gives a slight rise between the trucks and the center of the car.

Fig. 5.

The schedule speeds under which the cars will operate will be from 9.5 to 10 miles per hour with approximately nine stops per mile. Although the new motors will operate on cars having small wheels, the design of the motors is in

no way radical. They followed well tested and recognized standards in both mechanical and electrical design. In addition to the modifications in mechanical design necessary for adaptation to 24-inch wheels, there has been incorporated a more efficient scheme of ventilation than the method now used in the well known types of ventilated motors made by the General Electric Company. This improvement has resulted in a further reduction in weight without sacrificing the capacity of the motor for the work it is designed to perform.

With the combination of weight reduction, the larger portion of which has been effected in the motors and trucks, and the high continuous capacity of the motors, it is possible to carry the same number of passengers with these motors, having the nominal 30-horsepower rating, in the same service that cars with 30-inch wheels were formerly employed, equipped with 40-horsepower motors and weighing from 2.5 to 4.5 tons more. Thus another very important advance has been attained in electric railway engineering.

The field coils of the new motors are asbestos-insulated and impregnated, which results in a solid structure, practically indestructible and moistureproof. They are supported on spring metal seats and are securely held from movement in any direction by spring flanges, resulting in evenly distributed pressure and preventing abrasion of the insulation. The armature shaft is removable without disturbing the commutator connections or windings. The shaft bearing surfaces are ground and rolled. The armature is banded while hot, which insures permanently fixed and tight coils. The armature bearing linings are bronze with a thin layer of babbitt. The oil-well covers have deep lips and fit on machined seats, so that water is prevented from entering and flooding the wells.

The brush-holders are adjustable and are supported by mica-insulated studs. The car axles between the motor-axle bearings are entirely inclosed with sheet-steel dust guards. The motors have a gear ratio of 58 to 15. Both the gears and pinions are solid and are made from heat-treated rolled steel having an elastic limit of 140,000 to 150,000 pounds per square inch. The gear cases are steel, each upper and lower half being pressed out in a single integral piece. The steel supports for the top and bottom halves of the cases are fastened by means of welding.

The control system used is the Sprague-General Electric type M, which will be arranged to operate, however, on what is known as the Jones system of control. In this system of control, the sequence of connections is so arranged that during the entire period of acceleration practically all resistance is cut out. It is designed by P. N. Jones, general manager of the Pittsburgh Railways Company, and is described by him as operating through using a permanent series connection between all of the motors in a four-motor equipment without the use of resistance. Rheostat losses are thus virtually eliminated.

There are seven notches on the controller, of which three are running positions. On the first notch the four motors are connected in series through a small resistance, which is used only to avoid the jar of starting when the gears and pinions become worn so that back lash exists between the teeth. The second notch leaves all motors in series, but cuts out the resistance, and this is a running position. The resistance remains cut out on all subsequent notches. The third controller notch connects two motors in series, leaving the other two to run idle, thus giving an easy transition to the fourth notch in which the motors are connected in series-parallel. This is a running notch. In the fifth position of the controller handle two of the motors are left in series, and one of the other two motors takes full voltage, the third motor running idle. In the sixth position one of the two motors in series is cut out, the car being propelled during this period by two motors, each of which takes full voltage. The seventh position, which is the notch for full-speed running, all motors are in parallel and take full voltage.

Nitrogen-Filled Lamps for Theater Facade Illumination.

In the accompanying illustration is shown the exterior of the Miles Theater, Minneapolis, Minn. The illustration was made from an untouched photograph taken by artificial light entirely. The brilliant illumination in front of this theater is obtained by means of five 1,000-watt nitrogen-filled Mazda tungsten lamps. These lamps are mounted in enameled steel reflectors, so as to throw their illumination entirely downward. The brilliance of the illumination effect is very well shown by the illustration. The entire width of the street is exceptionally well lighted, with practically every paving block clearly discernable. The lamps are mounted a few feet above the edges of the marquee. The illumination they produce is so intense upon the sidewalk that a shadow is noticeable underneath the marquee.

This installation has caused much comment and has been instrumental in producing similar installations before other theaters in the city. The lamps were supplied by the Bryan Marsh Works of General Electric Company. The installation was made by the Sterling Electric Company, of Minneapolis. This company had one of the nitrogen lamps conspicuously displayed in its store when the manager of the Miles Theater observed it one day, and becoming enthusiastic about its utility forthwith ordered the installation to be made in front of his theater.

Lighting by Nitrogen Lamps in Front of Miles Theater, Minneapolis.

New Golden Glow Headlights.

The Esterline Company, Indianapolis, Ind., has added two new Golden Glow headlights to its line. While these two new headlights embody the use of the Golden Glow glass reflectors which characterize the Esterline Company's lighting products, they possess several new and important features.

The lamp bodies and fronts are made

entirely of pressed steel, which materially reduces the weight and improves the appearance of the headlights. In the design of these lamps the makers have taken advantage of the accuracy with which steel stampings can be made, thus producing a headlight which is waterproof and dustproof. A metal ring, which holds the reflector in place, also clamps a heavy gasket over

Golden Glow Headlight Recessed in Dash.

which the front or door presses, making a very tight joint.

The hinges and latches are designed so as to have no projecting portions likely to catch wires or ropes. Another innovation is the use of electrically welded joints and fastenings instead of screws or rivets. The headlights are properly ventilated in such a manner as not to admit dust or water, which prevents sweating and clouding of the reflector and front glass.

After assembling, the lamp bodies are given several coats of baked enamel, inside and out to render them proof against rust. The front glass, which

Golden Glow Headlight Mounted on Front of Dash.

is made extra heavy, is held in place by spring clips which permit of expansion and contraction without cracking the glass.

In the construction of the new headlights nine-inch Golden Glow reflectors are used. These give a headlight larger in diameter and deeper, allowing for sufficient space for lamps up to 60 watts. One type of these headlights is made to recess into the dash of the car, while the other is designed for mounting on the front of the dash.

The Golden Glow headlights, the makers state, meet the demands of railway men for a headlight which projects a non-blinding light of sufficient intensity to serve as a warning to other kinds of street traffic under all weather conditions. They also enable motormen to see a car ahead a sufficient distance to prevent collisions, and to see which way track switches are thrown as they approach the switch.

Recent tests of these new headlights fitted with a 36-watt lamp, on a city street and dark night, showed that the second hand of a watch can be read at a distance of 600 feet, and that, from the car, a man lying on the track can be seen further than is possible with an arc lamp.

The Esterline Company states that 60 railways and steamship lines are now using Golden Glow headlights, and many of them complete equipments. While thousands of these headlights are in use, not a single accident to persons or equipment has been

Front View of Headlight.

reported, due to lack of light on the right of way or failure to see the approaching car.

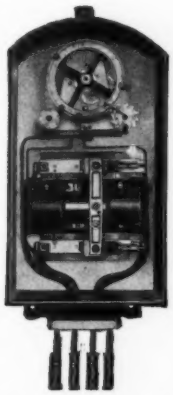
Aristo Time Switch.

A new type of electric time switch has been placed on the market by the Chicago Electric Time Switch Company, 2213 Michigan Boulevard, Chicago. This switch has a number of distinctive features, one of which is that it is operated entirely by electrical means and is substantially free from such mechanical contrivances as springs, gears, trips, cams, dogs, etc. This simplifies the arrangement of the control gear and reduces the possibility for trouble. The control is by means of solenoids which provide a very quick action for the switch. Thus this switch is given a very quick break which of course is desirable when opening circuits carrying heavy currents. To further reduce the tendency to arc on opening the circuit, carbon break contacts are provided.

The switch is mounted in a cast-iron waterproof and dustproof case, so that it can be mounted outdoors or indoors as desired. The clock for controlling the switch is of the eight-day type and is especially designed for this purpose. The clock is used merely for controlling the solenoids and is not called upon to provide the power for operating the switch. The solenoids are energized only at the moment of switch action; thus the arrangement of the switch is a very economical one.

The standard Aristo switch is arranged so that the circuit can be closed or opened as frequently as each hour throughout the day, which is a feature seldom incorporated in automatic time switches. The company is also manufacturing special time switches that can operate to close and open the circuit at still shorter intervals if desired. The intervals do not have to be identically the same; they may be made irregular, if desired.

A special form of this switch is also



Aristo Automatic Time Switch.

manufactured for remote control. In this switch the clock mechanism is mounted at any desired place so as to be readily accessible for weekly winding and adjustment of the operating periods. The switch itself is installed at any convenient point in the circuit, so as to minimize the amount of wire needed, which is an important consideration when heavy circuits are to be controlled.

Central Electric Publishes Big Automobile Supply Catalog.

An innovation in catalogs has just been produced by the Central Electric Company, 320 South Fifth Avenue, Chicago. This relates to the 160-page book on automobile supplies. Four pages of indexes and cross indexes render finding very simple, and the arrangement of descriptive matter and illustrations facilitate ready reference. The book is bound attractively in a gray cover, printed in colors, and is mailed in a special sealed envelope, assuring the protecting of the contents.

Packard Bell-Ringing Transformer.

The illustration herewith shows a new bell-ringing transformer which has just been placed on the market. A very special feature of merit about this transformer is the fact that the case is made entirely of porcelain. There is thus no iron case to rust out and ground the windings. Moreover, the porcelain case is of pleasing appearance, making a nice window display. It is furnished in three colors, white, brown and gray. The core is made of silicon steel and the coils are form-wound and vacuum-treated. The entire case is filled with insulating compound.

This transformer stands a complete short-circuit continuously without damage either to itself or connections. The primary is wound for connection to alternating-current circuits ranging from 100 to 130 volts and 60 to 133 cycles.

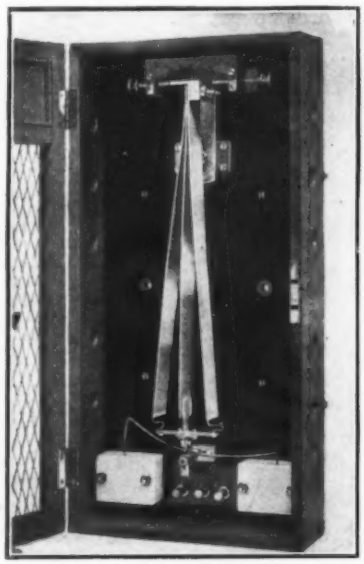
Porcelain-Incased Bell-Ringing Transformer.

Large facilities for manufacturing make it possible to place it on the market at a price not exceeding that of the ordinary type and a liberal proposition is made to contractors and jobbers. This transformer is manufactured by the Packard Electric Company, Warren, O.

Automatic Temperature Regulator for Electric Radiators.

It is a great advantage to be able to keep a room heated to just the same degree in order to secure a uniform temperature, for this means much more comfort and avoids the drawback of overheating the room and the need for opening of windows to expel the surplus heat, with its attendant liability of exposure to cold drafts. A considerable reduction in the current bill is another advantage achieved by a thermostatic regulator if electric heating is employed. All this is done by the new Grundy electric regulator, which keeps the temperature uniform to one degree and even less. It operates in connection with an electric air heater or radiator of the customary kind, preferably in round stove form.

The long blades of the regulator are of different metals so that by their contracting or expanding at different rates under heat, the three-bar piece travels back and forth as a whole, and its lower end bears upon a curved piece or lever so as to tilt it. The ends of this latter piece work in mercury cups so as to make and break the circuit. When the heat becomes too great, the three-bar piece moves and trips the lever so as to break the circuit, cutting off current from the electric stove until the heat falls again to the standard, when the motion of the bar again throws on the current. A screw adjustment at the top permits setting to any desired degree at which the room is to be kept. Current for the heater is not controlled direct, but by means of a solenoid switch placed in the circuit.



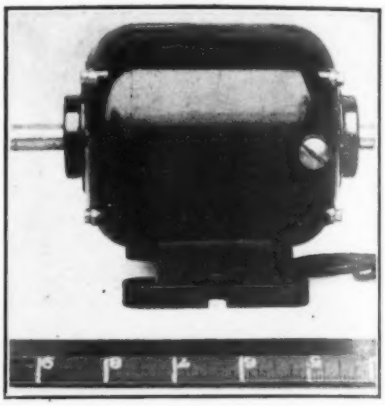
Temperature Regulator for Electric Radiators.

This thermostatic regulator is manufactured by A. Schonfield & Company, Glasgow, Scotland.

Ward Leonard Electric Lighting Equipment for Cyclecars.

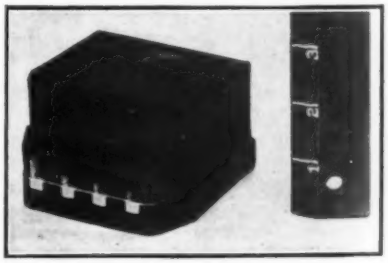
The Ward Leonard Electric Company, Bronxville, N. Y., appreciating that small automobiles such as cyclecars, etc., will have an electric lamp load of not more than five amperes, has developed for this trade a special electric lighting system. It is identical in its construction and method of operation with the larger outfits used on big cars, which demand a lamp load of approximately 9.5 amperes.

The dynamo delivers six amperes at 1,800 revolutions per minute, weighs less than nine pounds, and is very compact, as shown in the comparison of the dynamo with the scale which is photographed with it. The controller for the dynamo is of the separate constant-current control type, which has become well known on the larger generator outfits of the Ward Leonard Company; it is light in weight and its compact size can be gauged by comparison with the scale photographed with it. This controller also embodies the automatic battery switch.



Dynamo for Cyclecar Lighting.

Use of a constant-current control system is claimed to have many advantages, one of which is appreciated by cyclecar manufacturers, for with a constant-current charging system a smaller charging battery can be used than with any other type of charging system. This Ward Leonard cyclecar equipment is claimed to be the smallest, lightest and most inexpensive properly operated lighting system on the market.



Controller for Lighting Outfit.

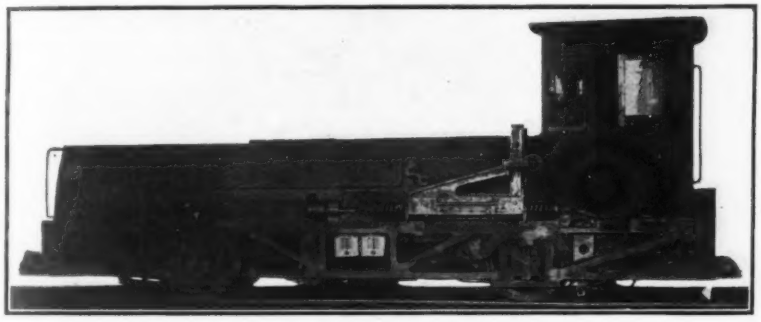
Electric Fog Horns for Warning.

The city of Bayonne, N. J., through the enterprise of the Electrical Committee of the City Council, will install electric fog horns at important street intersections to protect the public

from danger, and at the same time give warning to the police, trolley cars, etc., of the approach of fire apparatus when called out for service. The signs will carry the word "Danger" and will be illuminated day and night.

An Interesting Electric Locomotive.

For handling cars at the Cleveland ore docks, the Pennsylvania Lines West have recently had built three locomotives of unusual design. The most novel feature in these locomotives is that they do not run on the same tracks as the cars they move, but on narrow-gauge (42-inch) parallel tracks. They are not attached to the cars by couplings, but each locomotive is equipped with an arm on each side which can be lowered by means of compressed air controlled from the cab and acts as a pusher. Single cars or trains can be easily handled and cars can be shifted and cut out from trains with the least time and trouble.



Electric Switching Locomotive.

The locomotives are of Baldwin-Westinghouse make and are 25 tons in weight. They have bar-steel frames, which give great strength but permit ready access to the interior. The motors are of the Westinghouse commutating-pole type. Power is obtained from two rails lying inside the rails on which the locomotives operate; these rails are protected by a wood covering.

A Handbook for the Man on the Job.

The National Metal Molding Company, Fulton Building, Pittsburgh, Pa., has published a handbook on National metal molding and fittings. This illustrates and describes each fitting with its assembly and installation. It is essentially a handbook for the man on the job, and is full of useful information relating to the installation of electrical conductors with National metal molding. In addition to the matter dealing specifically with the National metal molding and fittings there is a chapter which illustrates in detail methods of utilizing this material to the best advantage in installations of practically every description. This is one of the most useful and practical handbooks that has been available for a long time, and will be found of considerable value to the electrical contractor and particularly the man actually at work in wiring practice.

British Westinghouse Profits.

More business and better prices during 1913 enabled the British Westinghouse Electric & Manufacturing Company to show a greatly improved result, and as a result of its friendly relations with Continental Westinghouse companies still better profits are anticipated. The profits for the last six years are given below:

1913—Net profit	$532,470
1912—Net profit	205,370
1911—Net profit	103,540
1910—Net profit	62,183
1909—Loss	3,993
1908—Loss	37,228

Orders for apparatus of Westinghouse manufacture were 40 per cent better in 1913 than in 1912.

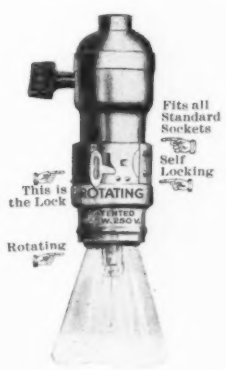
Rotating Electric Lamp Lock.

Much study has been given in recent years to means for adequately protecting high-priced electric lamps, reflectors and shades from unauthorized removal or theft. Of the various lamp-locking devices now on the market, the one illustrated herewith has several unique features. One of these is that it can be fitted to any standard socket in a moment. After insertion, the lamp can be rotated in either direction without removal. A key of special construction must be inserted in the lock before the lamp or the entire locking device with the lamp can be removed.

The device itself may be described as a plug socket, the plug of which fits all standard sockets; the socket of the device, which receives the lamp, has a rotating screw shell that can be held stationary for inserting or removing the lamp only by using the key to force a spring into an opening in the screw shell.

Surround the upper or plug end of the device is a sleeve, one half of which is hinged to form a door. This fits over the bead of the socket to which the device is attached and is self-locking by merely snapping the door in place. The key must be used to open this door and remove the device from the socket. The key is turned in the other direction to permit release of the lamp. Thus lamps can be renewed or removed for cleaning without taking the entire locking device from the socket, or the device can be removed with lamp and attached to another socket.

All parts of the device are well made and carefully insulated with fiber. The key is also partly made of insulating material; it is made in peculiar shapes that cannot be readily copied. Electrical connections are so perfect that the lamp can be rotated while lighted without flickering. The rating of the device is 660 watts, 250 volts. The device has been approved by Underwriters' Laboratories. It is patented and manufactured by the Rotating Electric Lamp Lock Company, 4433 North Crawford Avenue, Chicago, Illinois.



Rotating Lamp Lock.

More Telephone Train Dispatching in South.

Vice-president T. C. Powell of the Alabama Great Southern Railroad, Queen and Crescent system, announces that the telephone will be substituted for the telegraph in dispatching trains and handling messages on the entire line of 296 miles between Chattanooga, Tenn., and Meridian, Miss. For this purpose two copper circuits will be constructed and instruments installed at every station and block office. The telephone has been used with success on the main Queen and Crescent line, so that soon trains will be handled by telephone for the entire distance of 630 miles between Cincinnati and Meridian.

Latest Approved Fittings

The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.

CABINETS.—Standard Electric Fittings Company, Stamford, Conn.

Cabinets shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters and examined at factories and passed by Underwriters' Laboratories, have labels attached to each cabinet.

Approved March 25, 1914.

CONDUIT OUTLET BUSHINGS, COUPLINGS AND FITTINGS.—The Adapti Manufacturing Company, Winter and Leonard Streets, Cleveland, O.

"Adaptiboxes."

Outlet boxes for use with rigid conduit for sizes one-half to four inches inclusive. Type 2,700. Pole cap; catalog No. 4,500.

Approved March 13, 1914.

CONDUIT OUTLET BUSHINGS, COUPLINGS AND FITTINGS.—F. E. Baldwin, 115 S. Sherman Street, Wilkes-Barre, Pa., submitter; manufactured by Wilkes-Barre Indicator Company, 115 South Sherman Street, Wilkes-Barre, Pa.

"Jiffy Bushing." A sheet-metal conduit-box connector for armored cable, with eccentric holes for connecting to the flexible armor and bent prongs for engaging with the opening in the box.

Approved March 19, 1914.

CUTOUT BASES, Cartridge Fuse.—The Johns-Pratt Company, Hartford, Conn., manufacturer; E. H. Johns-Manville Company, New York, N. Y., sole agents.

These devices consist of special cutouts bases inclosed in cabinets and arranged to facilitate the testing of meters on the customers' premises without interrupting the service.

The cases of No. 16 U. S. gage metal are sealable as a protection against tampering with the circuit.

Class B meter-testing blocks; catalog No. 9,101, 0-30 amperes, 250 volts, four-pole; catalog No. 9,129, 0-30 amperes, 250 volts, five-pole; catalog No. 9,130, 31-60 amperes, 250 volts, five-pole.

Approved March 19, 1914.

GROUND CLAMPS. — National Metal Stamping Company, Mulberry and Murray Streets, Newark, N. J.

National ground clamp. A two-piece clamp of copper having the ends secured by a single bolt and provided with a lug for soldered connection to the ground wire, adjustable for use with armored cable, metal moulding and pipe, or conduit up to one inch in diameter.

Approved March 26, 1914.

GROUND CLAMPS.—H. & H. Manufacturing Company, 1009 North Marshall Street, Philadelphia, Pa.

"H. & H." ground clamp.

A single-piece clamp of tinned copper, provided with suitably spaced holes and with bolt, nut and washer, for clamping to rigid conduit. Adjustable for use with conduits up to one inch in size. One end of clamp is channeled to form the equivalent of a lug, for soldering to the ground wire.

Approved March 14, 1914.

MOLDING FITTING. — National Metal Molding Company, Fulton Building, Pittsburgh, Pa.

Fittings for use with "National" metal molding.

Crosses, tees and elbows; catalog No. 437.

Straps; catalog No. 428.

Flush switch adapters; catalog No. 384 and 441.

PANELBOARDS.—Starrett Electric Company, 215 South Superior Street, Chicago, Ill.

Panelboards shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters, and examined at factories and passed by Underwriters' Laboratories, have labels attached to each panelboard.

Approved March 11, 1914.

PICTURE MACHINES AND APPLIANCES. — Cameron Picture Machine Company, 61 Poplar Street, Brooklyn, N. Y.

"Cameron Motion Picture Projector." Two types; one for hand operation, the other driven by one of the special motors mentioned below supplied by the Cameron Picture Machine Company, and expressly approved for this purpose.

Direct-current motor: Colonial Fan & Motor Company, one-eighth horsepower, 110 volts.

Alternating-current motor: Colonial Fan & Motor Company, one-eighth horsepower, 110 volts.

Approved March 24, 1914.

RECEPTACLES, Standard. — The Tregoning Electric Manufacturing Company, 418 Prospect Street, Northwest, Cleveland, O.

"Tregoning" receptacles, 660 watts, 250 volts.

Cleat type; catalog No. 303.

Sign; catalog Nos. 300, 301, 302, 310.

Approved March 10, 1914.

RHEOSTATS.—Jewel Electric Company, 115 Hollingsworth Street, Baltimore, Md.

Type LN reversing controllers for direct-current electric elevators, five to 20 horsepower, 110 to 500 volts.

Each controller consists of main-line and reversing switches mounted on a slate panel and operated from the shipper shaft of the elevator, and a series of contractors which short-circuit a wire-wound resistance inclosed in a cast-iron case.

Approved March 24, 1914.

SOCKETS, Standard.—The Arrow Electric Company, Hartford, Conn.

"Arrow E" porcelain shell.

Key, 250 watts, 250 volts; catalog Nos. 4,058, 4,065.

Keyless, 660 watts, 250 volts; catalog Nos. 4,059, 4,066.

Pull, 250 watts, 250 volts; catalog Nos. 4,015-4,017, inclusive, 4,060, 4,067.

Approved March 20, 1914.

SWITCHES, Automatic. — Venner Time Switches, Limited, 6 Old Queen Street, Westminster, London, S. W. England.

"Type C 4" 25 amperes, 250 volts; 12 amperes, 500 volts.

Double - pole, mercury - contact switches for the control of lighting circuits. Clock mechanism and special switch gear inclosed in cast-iron case. Provided with flexible leads extending through bushings for connection to supply and lead wires.

Approved March 20, 1914.

SWITCHES, Automatic. — Chicago Electric Time Switch Company, submitted, 5128 Prairie Avenue, Chicago, Ill. Manufactured for the above by Atlas Model Works, 125 South Fifth Avenue, Chicago, Ill.

"Aristo" electric time switch, 25 amperes, 250 volts, alternating current and direct current. This device consists of an eight-day, 24-hour clock, arranged to open and close a circuit by solenoid-operated contacts.

Approved March 25, 1914.

SWITCHES, Knife.—Trumbull-Vanderpoel Electric Manufacturing Company, Bantam, Conn.

125, 250 and 600 volts; all capacities.

Approved March 10, 1914.

WIRES, Rubber-Covered.—Canadian General Electric Company, Limited, 14-16 King Street, Toronto, Canada.

Marking: One red and one black thread crossing in the braid.

Rubber-covered wires shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters, and examined at factories and passed by Underwriters' Laboratories, have labels attached to each coil.

Approved March 18, 1914.

Current Electrical News

NORTH ATLANTIC STATES.

BRATTLEBORO, VT.—The Crowton Development Company has been organized for the purpose of constructing and owning real estate, storage reservoirs, water power, hydroelectric and steam plants. The capital stock is $200,000 and the incorporators are F. L. Houghton, Fred W. Putman and J. B. Manley, all of Brattleboro.

CHICOPEE, MASS.—Electric power will replace the present steam method at the Cooley Brook pumping station in the near future, according to Charles A. Bogardus of the Water Department. Requests for bids have been sent to a number of electrical contractors and as soon as their estimates have been furnished to the department, work on the installation of electric motors and equipment will begin. Motive power will be obtained from the municipal electric lighting plant.

NEW HAVEN, CONN.—The Southern New England Power Company has been granted articles of incorporation; capitalized at $100,000.

CATSKILL, N. Y.—The Kingston Ellenville Trackless Trolley Company has been incorporated with a capital of $5,000. The directors are John Purce, George J. Giger and Frank Leonard, all of Paterson. According to its certificate, the company has permission to run its cars from Kingston to Ellenville through Hurley, Marbletown, Stone Ridge, Accord, Kerhonkson and Warwasing.

NEW YORK, N. Y.—Columbia Mills Power Company, Incorporated, has been granted articles of incorporation, capitalized at $500,000, to manufacture electricity. The incorporators are T. D. McChesney and William R. Hees, of New York City, and George H. Hees, of Toronto, Canada.

ROCHESTER, N. Y.—The Rochester Telephone Company is planning extensive improvements to its local equipment, including a new switchboard.

SENECA FALLS, N. Y.—The Municipal Board is making plans for the extension of the lighting system on various streets of this village. The lamps will be of the same style as those used at present in this village, the large pedestals being of concrete and one lamp used. Address the village clerk for desired particulars.

BAYONNE, N. J.—The City Council is arranging to pass an ordinance requiring the installation of underground conduits throughout the city. The Public Service Company will be affected by the law. A.

NEWTON, N. J.—The Board of Public Utility Commissioners has ordered William L. Keplinger receiver of the Newton Gas & Electric Company to make improvements and additions in the company's electric light and power, and gas plants and system to render adequate local service. A.

SAYREVILLE, N. J.—The Township Committee will install an electric lighting system in the Morgan Heights district, and on the highway to Morgan. The Sayreville Electric Light & Power Company and the New Jersey Central Traction Company will supply the electric energy. A.

TRENTON, N. J.—H. M. Voorhees & Brother will install an electric light and power plant in their new department store on East State Street. A.

SOUTH ATLANTIC STATES.

WILMINGTON, DEL.—The South Kentucky Power Company has been incorporated with a capital stock of $100,000, to acquire power and water rights of all kinds. The incorporators are F. D. Buck, George W. Dillman, M. L. Horty, all of Wilmington, Del.

CHESTERFIELD, VA.—The City Council has granted a franchise to the South Richmond & Chesterfield Railway Company, to construct an electric railway in Chesterfield. F. R. Armstrong, of Rochester, Minn., is president.

NORWOOD, VA.—The Nelson County Telephone Company has been incorporated with a capital stock of $3,000. S. M. Golloday, Buffalo Station, Va., is president.

WHEELING, W. VA.—Plans and specifications for new power houses to be constructed at dams Nos. 15 and 20 on the Ohio River have been prepared by the local United States engineers, and bids on the contract will be asked in the very near future. Dam No. 15 is located at New Martinsville and No. 20 at Belleville, O. The houses will be of brick, and the contracts will also include clauses referring to the installation of equipment.

ELKIN, N. C.—The Center Falls Power Company, Elkin, has been incorporated with a capital of $25,000, subscribed by A. M. Smith, R. H. Chatham and others, for development of water power for long-distance electric transmission and for providing light and power for public service and general purposes.

CANTON, GA.—An election will be held on May 23 to decide the question of issuing $5,000 in bonds for enlarging the electric light plant. Address Howell Brooke, mayor, for further particulars.

TALBOTTOM, GA.—The city is planning to obtain current from city of Manchester, Ga., for an electric lighting system. Address John A. Smith, mayor, for desired information.

NORTH CENTRAL STATES.

CINCINNATI, O.—The City Council of Cincinnati will appropriate $50,000 for a new police station in Walnut Hills. Various electric equipment will be required, including wiring.

CINCINNATI, O.—The Union Gas & Electric Company has announced that it will extend its lines to Sayler Park, Fernbank and Delhi, suburban villages, as soon as arrangements can be made to do so.

CLEVELAND, O.—The city of Cleveland will spend $100,000 for a distribution system for its East Fifty-third Street municipal electric light plant. The money has been appropriated, and contracts will shortly be let for the work.

MASSILLON, O.—The plant of the Massillon Electric & Gas Company is to be enlarged immediately to three times its present size, at an estimated cost of $125,000, to supply current for new industries. R. A. Brooks is manager.

SANDUSKY, O.—The Sandusky Gas & Electric Company has installed two ornamental electric light standards in front of the postoffice in that city, each carrying two 145-candlepower tungsten lights inclosed in ball globes, and another in the residential district of the city, for the purpose of demonstrating the efficiency and beauty of this means of public lighting. They have given such satisfaction that plans are under way for lighting a number of the streets in this manner.

SEBRING, O.—Cluster lights are to be placed on 15 streets. Address the city clerk.

SYCAMORE, O.—The village of Sycamore, which has a population of about 1,000, has closed its electric light plant and an election will be called to decide upon the proposition of issuing bonds to make the necessary improvements for reopening.

EVANSVILLE, IND.—The Evansville & New Harmony Traction Company has been incorporated with a capital stock of $15,000 to build a traction line from here to New Harmony, Ind., a distance of 30 miles. A campaign to sell bonds for the purpose of financing the road will be started here soon. Address the secretary of the company for information.

SHELDON, ILL.—A municipal lighting system will be established here. Address the village clerk for general information.

MARQUETTE, MICH.—At a recent meeting of the officials of the Marquette County Gas & Electric Company, of which A. C. Harrington is the manager, it was decided to run wires to Palmer, five miles to the south of Negaunee, in order to supply current to the residents of that place.

NORTH BRANCH, MICH.—The Council plans to expend $7,000 improving the electric light plant. Address the village clerk for particulars.

OMER, MICH.—A new telephone company was organized by J. K. Mead, manager of the Omer Telephone Exchange. Frank Nowak is president. This line will connect with the Omer Exchange and starts with 16 subscribers.

JANESVILLE, WIS.—To enlarge and reinforce telephone facilities serving practically every part of the city, the Wisconsin Telephone Company will spend $25,000 in improvements in Janesville this spring. With the proposed addition of 1,600 miles of telephone wire, as provided in the present plans, telephone facilities will be adequate to care for growth in all parts of the city. Address the local manager.

MAYVILLE, WIS.—Central Mayville Mutual Telephone Company has been incorporated with a capital of $600 by Gust Laach, G. F. Schmidt, N. H. Laveen, Herman Krase and George Koehn.

LITTLE FALLS, MINN.—The Little Falls Water Power Company has just commenced the erection of a modern, concrete, reinforced dam to take the place of the old timber structure erected in 1887. Provision will be made for a large extension to the present generating plant to care for further business. Mr. Ralph D. Thomas, of Minneapolis, prepared the plans and specifications, and is overseeing all of the work.

EAGLE GROVE, IOWA.—The Evergreen Mutual Light & Power Company has been incorporated with a capital stock of $10,000. The nature of business to be transacted is the construction and maintainance of an electric light and power line in Wright and adjoining counties, Iowa.

NEVADA, IOWA.—The Franklin Township Lighting Company has been formed here for the purpose of furnishing light for the members of the company. Samuel Kooser is president and E. C. Wonderlich, secretary.

SIBLEY, IOWA.—May 5 bids will be received for the proposed electric light plant and distributing system to be constructed here. Address George F. Dietrich, mayor.

SULLIVAN, MO.—Electric Light & Power Company has been incorporated with a capital of $25,000 by Richard Zinkman, E. W. Illien and W. E. Anderson.

GRANVILLE, N. D.—Andrew Thrane and John Kvame, of this place, and John H. Muus, of Vleva, have incorporated the Farmers Telephone Company, with a capital stock of $15,000.

PINGREE, N. D.—The James River Valley Telephone Company has been granted a franchise for extension of its lines.

PORTAL, N. D.—Plans for the establishment of an electric power plant that will supply Portal, Bowbells and Flaxton, and possibly one or two other cities, are under way here. The estimated cost of the plant is $35,000. Portal already has a plant sufficient for local needs, and the plans to supply the other towns contemplate the increasing of its capacity. The nearness of lignite coal mining properties to this place makes the proposition feasible.

LETCHER, S. D.—Bentley Township Telephone Company has been incorporated with a capital of $25,000 by N. M. Steinpler, George I. Green and Henry Larimer.

WESSINGTON, S. D.—A. H. Savage, of Minneapolis, holds a 30-day option for the purchase of the local electric light system. If he purchases the system, he will make many improvements and increase its capacity.

YANKTON, S. D.—The South Dakota Telephone Company has been incorporated with a capital stock of $1,500,000 by E. A. Bruce, W. L. Bruce and others.

DODGE CITY, KANS.—A transmission line from Dodge City to St. Marys of the Plains Academy, near that city, has been asked by Bishop Hennessey. M.

PITTSBURG, KANS.—The "White Way" contract was awarded to the United Iron Works of this city at a price of $12,383. The city will erect the poles, of which there will be 173, each one bearing a cluster of four lamps. The outside wiring will be done by the Home Light, Heat & Power Company.

WELLSVILLE, KANS.—The City Council has passed an ordinance providing for the use of 60 lamps in street lighting, many of which will be 200 candlepower, and the remainder half that power. C. A. Smith will install a lighting plant at a cost of $25,000. M.

SOUTH CENTRAL STATES.

BUFFALO, KY.—C. L. Herron, head of the Hodgenville Lighting Company, is contemplating extending the company's service to Buffalo, Ky., a neighboring town. G.

FULTON, KY.—Engineer R. C. Houston, of Memphis, is preparing specifications to extend the light and water service to South Fulton. Address J. H. Swann, mayor, for information.

JACKSON, KY.—The Wolf Valley Coal Company, which is building a town for its employees in Eastern Kentucky, near Jackson, will construct an electric plant there for lighting and power purposes. It is understood that the same plant will supply the lights for the mine itself. G.

McBRAYER, KY.—Davis Brown, of the distillery firm of J. T. S. Brown & Sons, will install an electric-lighting plant for the distillery and a new summer home he will build near the distillery here. G.

WEST COVINGTON, KY.—The Union Light, Heat & Power Company has been granted a franchise to operate a street car line through the city for 20 years. Engineer W. L. Glazier, of Newport, is employed by the city to draw up the plans.

CHATTANOOGA, TENN.—Merchants of Seventh Street in this city are organizing a movement for installing a "White Way" in front of their places of business. The "White Way" installation along Market Street has spurred them to emulation. G.

HARTSELLE, ALA.—J. R. White has received a franchise to establish an electric lighting plant here.

OZARK, ALA.—$25,000 will be expended enlarging the municipal electric light plant. Address the mayor in regard thereto.

CUSHING, OKLA.—An election will be held May 15 to vote on a franchise to the Cushing Traction Co., which proposes to build an electric freight and passenger line from this city to the oil field at a cost of $250,000. Frank Brown, of Indepence, Kans., is president of the company.

GLEN POOL, OKLA.—The Glen Pool Mutual Telephone Company has been incorporated with a capital stock of $3,000 by Fred Markle, John Shaffer and others.

JET, OKLA.—A special election will be held May 5 to vote on issuance of bonds for the installation of an electric lighting plant to cost about $3,000.

MEHAN, OKLA.—The Stillwater Valley Telephone Company has been incorporated with a capital stock of $2,000 by C. M. McKenzie, William Varley, of Mehan, and others.

TULSA, OKLA.—Bids are being received for the furnishing of labor and materials, and installation of electrical wiring and fixtures in the new convention hall now being completed at a cost of $100,000. The city auditor, E. B. Cline, is custodian of plans and specifications.

CUERO, TEX.—The Cuero Light & Power Company has leased the Guadalupe River bed and will construct two dams for water power developing.

HANDLEY, TEX.—The Northern Texas Traction Company has been granted a franchise to construct, maintain and operate an electric power system at Handley.

PITTSBURG, TEX.—The Home Light & Ice Company will remodel and improve the light plant and $6,000 worth of new machinery will be purchased. Separate dynamos and engines will be used. The main lines will also be extended. H. E. Poynter is manager.

LUBBOCK, TEX.—A rural telephone company has been organized here and a number of trunk lines will be run 15 miles in the country. Address the county judge for information.

WESTERN STATES.

HARDIN, MONT.—The Big Horn Canyon Irrigation & Power Company has completed surveys for an electric railway 68 miles long, and is now surveying for the dam site and reservoir. The project includes the construction of a hydroelectric plant on the Big Horn River to develop 25,000 horsepower. Ed. Lawlor is secretary.

ISMAY, MONT.—The Ismay, Ekalaka & Southern Railroad Company has been organized here, with a capital stock of $500,000, and will construct an electric line from Ismay on the Chicago, Milwaukee & St. Paul Railway to Ekalaka, about 44 miles from Ismay. A. J. Halsey is general manager.

LAUREL, MONT.—The City Council is considering the installation of a new street lighting system to cover the business section of the city, and a large part of the residence section. Address the city engineer. O.

LEWISTON, IDAHO.—Commissioner Emery, A. M. Roberts, W. A. Morey and others, have been appointed by the City Council to investigate the proposition of constructing a dam in the Clearwater River, for the purpose of installing a municipally owned power plant. From estimates provided by an engineer, the plant will cost complete about $500,000. The Committee has been asked to report back to the Council as soon as possible. O.

POCATELLO, IDAHO.—The Idaho Pacific Railway Company has been organized to construct and operate an electric railway to connect Twin Falls County with the Hagerman Valley. M. J. Sweeley is president.

RUPERT, IDAHO.—Farmers in this vicinity recently organized and incorporated the Farmers Electric Company, of which M. T. McDermott is president; J. A. Plowman, vice-president; J. M. Butler, secretary and treasurer. The company is capitalized at $3,000, and purposes the erection of a power plant and extension of transmission power and light lines into the nearby territory. O.

JEROME, ARIZ.—Voters of this city will be given an opportunity on May 25 to vote on the proposition of granting the Upper Verde Public Utilities Company a franchise for an electric light and power system, telephone and telegraph, gas and water systems here.

PORT ANGELES, WASH.—The City Council recently granted the Olympic Power Company permission to extend, erect, operate and maintain a transmission line for the transmission of electric current of a voltage of 60,000 volts, from its main transmission line at a point on the Boulevard to its intersection with Third Street, and to its substation to be erected at or near this point. O.

SEATTLE, WASH.—The building of a substation of the city lighting plant at Ninth Avenue, S. W., and Henderson Street, is contemplated in an emergency ordinance now before the Council. It is estimated that about $10,000 worth of machinery will be necessary to successfully operate the additional plant. O.

WALLA WALLA, WASH.—Promoters of the newly incorporated Walla Walla River Power Company are engaged in securing rights of way on the Walla Walla River, preparatory to starting construction on an electric power plant. The company is capitalized at $120,000.

ANDREWS, ORE.—The Wild Horse Power & Milling Company will soon begin the construction of a small hydroelectric plant. Plans have been completed. Address Jean Bart Balcomb, engineer.

FOSSIL, ORE.—The Fossil Electric Light Company, formerly owned by August Ilse, has been transferred to M. Dittmer, of Spokane. The plant is valued at $40,000, and it is understood the new owner plans to make extensive improvements. O.

SACRAMENTO, CAL.—Resolutions were passed by the City Commissioners authorizing City Electrician Pearce to draw plans and specifications, with estimates of probable cost, for the construction of the municipal electric light plant.

SAN JOSE, CAL.—The new owners of the San Jose Terminal Railway, who state that they propose to run an electric line from Almaden, through this city, on to Alviso, and from that town to Port San Jose and out to deep water, there to connect with a line of steamers to San Francisco, have been granted the franchises they desired for constructing and operating their proposed line within the municipal limits. The road has the backing, it is said, of a syndicate composed of Lee H. Landis, president of the Tidewater & Southern Railroad; Eric Lindbloom, W. W. Jones, Charles A. Warren and John J. Mahoney, all of San Francisco, and others. The road must be completed within the city by January 1, next.

SANTA BARBARA, CAL.—The Santa Barbara & Suburban Railway Company is considering the construction of an electric railway from Santa Barbara to Carpinteria. W. A. Brackenridge is manager.

FAIRBANKS, ALASKA.—Local agents, representing John L. Timmins, have filed a claim to the waters of the Nenana River, where it is proposed to build a power plant capable of generating sufficient electricity to supply the entire district. Mr. Timmins recently informed his agents that he has been successful in his efforts to interest capital in the enterprise, and that preliminary work will be started soon.

PROPOSALS.

ELECTRIC LIGHT FIXTURES.—Bids will be received on May 7 for furnishing and putting in place the electric-light fixtures for the new Grand Forks County courthouse, Grand Forks, N. D., according to plans and specifications on file in the auditor's office, prepared by Buechner & Orth, architects, St. Paul, Minn. Address Hans Anderson, county auditor.

ELECTRICAL EQUIPMENT.—Sealed proposals will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until May 19 for furnishing 5,400 feet of submarine steel-armored telephone cable (twisted pair) five-pair, as per Schedule 6712, for delivery at the Navy Yard, Brooklyn, N. Y.; until May 26 for furnishing one electric freight elevator, as per Schedule 6704, for delivery at the Navy Yard, Charleston, S. C.; one electric furnace for shrinking pit for five-inch 50-caliber gun, as per Schedule 6703, for delivery at the Navy Yard, Washington, D. C.; 100 telephone head sets, as per Schedule 6709, for delivery at Navy Yard, Washington, D. C.

FOREIGN TRADE OPPORTUNITY.

[Where addresses are omitted they may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., and at the branch offices of the Bureau, 315 Customhouse, New York, N. Y., 629 Federal Building, Chicago, Ill., Association of Commerce Building, New Orleans, La., and 310 Customhouse, San Francisco, Cal. Apply for addresses in letter form, giving file numbers.]

NO. 12,996. ENGINES, MOTORS, SEWING MACHINES, AND MUSICAL INSTRUMENTS.—A business firm in the Far East informs an American consulate that it desires to receive quotations and catalogs of motors, from such American manufacturers as might be willing to deal direct with the market in question. Correspondence may be in English.

NEW PUBLICATIONS.

WISCONSIN WATER POWERS.—A paper read before the Engineering Society of Milwaukee in January by Daniel W. Mead, entitled "The Present Status of the Water Powers of Wisconsin," has been separately published.

MUNICIPAL ELECTRICIANS.—The eighteenth annual report of the International Association of Municipal Electricians covering the proceedings of the convention held at Watertown, N. Y., in 1913, has been published.

REGULATION IN GREAT BRITAIN.—Appendix G of the annual report of the Public Service Commission for the First District of New York for the year 1913 has been separately published. It is entitled "Regulation of Public Service Companies in Great Britain," by Robert H. Whitten.

WATT-HOUR METERS.—Technical Paper No. 207 of the Bureau of Standards, Washington, D. C., is entitled "A Comparative Study of American Direct-Current Watt-hour Meters," by T. T. Fitch and C. J. Hunter. Six types of meter have been studied and performance data are given.

NEW INCORPORATIONS.

TULSA, OKLA.—The Drumright Ice & Light Company has been incorporated with a capital stock of $30,000 by Charles W. Shobe, Charles F. Petty and others.

BASIC CITY, VA.—The Price Electric & Manufacturing Company has been incorporated with a capital stock of $500,000. Paul Steinman is president, and T. A. Sammis, of this city, secretary.

NEW YORK, N. Y.—Berk Electric Company, Incorporated, has been granted articles of incorporation, capitalized at $2,500. The incorporators are Maxwell B. Berk, Lionel P. Bristweller and James E. Beggs, of this city.

NEW YORK, N. Y.—Kelvin Electric Company, Incorporated, has been granted articles of incorporation, capitalized at $25,000. The incorporators are Clarence McMillan, Solomon Popper and Katherine Tikios, all of New York City.

NEW YORK, N. Y.—Nathan Klein & Company, Incorporated, has been granted articles of incorporation, with a capital stock of $20,000, to deal in electric motors, etc. The incorporators are Nathan Klein, David Price and Isadore Jacoby, of New York City.

CLEVELAND, O.—Gould Storage Battery Company has been incorporated with a capital stock of $10,000 to deal in storage batteries. The incorporators are R. P. Anthony, C. Koenig, John A. Nieding, L. A. M. Pejein and Quay H. Findley.

BURRAGE, MASS.—Sun Electrical Manufacturing Company has been incorporated to deal in supplies; capitalized for $25,000. Gabriel B. Levy, Brookline; Julius Nelson, Boston; Samuel O. Reinstein, Brookline; Frank Sanford, Bryantville, are the incorporators.

KANSAS CITY, MO.—The Stephens Gas-Electric Chandelier Company has been incorporated with a capitalization of $20,000. The company will continue the business of the Stephens Gas-Electric Appliance Company. D. S. Stephens will continue as president. Others interested in the company are E. G., S. B., and M. L. Stephens, W. C. Chapman, A. E. Briggs and P. C. Chapman. M.

RICHMOND, VA.—A charter has been issued to the National Securities Corporation, a holding company capitalized at $25,000,000, which will have headquarters in this city. Murray M. McGuire is president, Thomas P. Bryan, vice-president, and John S. Eggleston, secretary-treasurer, all of Richmond. The corporation is incorporated to construct, equip, improve or work upon any and all kinds of plants for the manufacture, storage, utilization, supply or disposition of electricity, gas, water or steam, or of power produced thereby, and to do a general contracting business.

FINANCIAL NOTES.

The reorganization committee of the American Water Works & Guarantee Company has appointed E. C. Converse, former president of the Bankers Trust Company, New York City; William Nelson Cromwell, of Sullivan & Cromwell, New York City; Howland Davis, of Blake Bros. & Company, New York City; Andrew Squire, of Squire, Sanders & Dempsey, of Cleveland, and Albert H. Wiggin, president of the Chase National Bank, New York City, to act as voting trustees of the new American Water Works & Electric Company stock, covering a period of five years. Robert Wetherill, of R. Wetherill & Company, of Chester, Penn., it was announced by the committee, will serve on the board of directors of the new company.

Dividends.

	Term.	Rate	Payable
American Rys. pr.....	Q	1.75%	May 15
Automatic Elec.	Q	1 %	May 1
Bellows F. Pow. pf....S-A		2.5 %	May 1
Cent. St. Elec. Corp....	Q	1 %	May 19
Col. Ry. Pow. & Lt. pf. ..		1 25%	May 1
Conn. Ry. & Lt. pf.....	Q	1 %	May 15
Kaministiquia Pow. ...	Q	1.5 %	May 15
Kellogg Sw. & Sup.....	Q	3 %	May 2
Lehigh Val. Tr. pf.....S-A		1 %	May 11
Mont. Lt., Ht & Pwr...	Q	2.5 %	May 15
Ohio Trac. Co.....	Q	1.25%	May 1
So. Cal. Edison com....	Q	$1.50	May 15

Reports of Earnings.

CONSUMERS POWER OF MICHIGAN.

Consumers Power of Michigan reports earnings for the three months ended March 31, 1914, and for the 12 months ended March 31, 1914, as follows:

	3 Months	12 Months
Gross earnings	$885,710	$3,216,089
Net after taxes.....	582,347	1,812,100
Surplus after charges....	302,321	759,444
Balance after preferred dividends	219,821	429,444

COMMONWEALTH POWER, RAILWAY & LIGHT.

	1914	1913
March gross	$242,732	$ 121,121
Net income	171,232	108,283
Balance after preferred dividends	91,232	78,283
12 months gross.....	2,360,428	1,267,660
Net income	2,122,560	1,228,104
Balance after preferred dividends	1,212,560	868,104

SOUTHWESTERN POWER & LIGHT.
(Consolidated statement of subsidiaries.)

	1914	1913
March gross .....$	205,895	$ 167,433
Expenses and taxes...	119,933	97,376
Net earnings	85,962	70,057
12 months gross.....	2,382,962	2,015,019
Expenses and taxes...	1,298,403	1,135,434
Net earnings	1,084,559	879,585

MEXICAN TELEPHONE & TELEGRAPH.

The report of the Mexican Telephone & Telegraph Company for the twelve months ended February 28, 1914, compares as follows (Mexican currency):

	1914	1913
Gross	$749,290	$716,742
Expenses	376,241	332,132
Net	373,049	384,609

KINGS COUNTY ELECTRIC.

Kings County Electric Light & Power Company's consolidated income account for the quarter ended March 31, 1914, compares as follows:

	1914	1913
Gross operating revenue .....$	1,652,743	$1,461,413
Operating expenses, taxes and depreciation.	1,055,893	879,688
Net operating revenue	596,849	581,724
Other income	16,259	16,086
Total income	613,108	597,811
Surplus after charges.	395,542	353,427

The company discontinued issuing monthly statements last November. Quarterly statements are regarded as a fairer criterion of their business.

REPUBLIC RAILWAY & LIGHT.

	1914	1913
March gross .....$	250,182	$ 225,177
Net after taxes.....	102,650	82,087
Surplus after charges..	58,946	35,784
12 months gross.....	3,024,870	2,755,205
Net after taxes	1,189,593	1,092,875
Surplus after charges..	659,768	559,575

KANSAS GAS & ELECTRIC.

	1914	1913
March gross .....$	107,612	$ 95,663
Net after taxes.....	34,295	31,781
Surplus after charges..	19,435	16,858
12 months gross.....	1,075,620	946,008
Net after taxes.....	389,867	323,882
Surplus after charges.	213,177	161,367
Balance after preferred dividends	108,177	56,367

PACIFIC POWER & LIGHT.

	1914	1913
March gross .....$	99,939	$ 94,397
Net after taxes.....	48,564	38,569
Surplus after charges..	17,585	11,834
12 months gross.....	1,307,305	1,259,462
Net after taxes.....	652,292	611,034
Surplus after charges..	294,769	315,598
Balance after preferred dividends	49,769	76,848

HAVANA ELEC. RY., LIGHT & POWER,
(Railway Dept.)

	1914	1913
Week ending April 19..	$ 53,043	$ 52,451
Jan. 1-April 19.....	853,118	841,593

EDISON ELECTRIC COMPANY OF BROOKLYN.

The Public Service Commission has issued a report covering the operations of the Edison Electric Illuminating Co. of Brooklyn for the year ended December 31, 1913, which compares as follows:

	1913	1912
Operating revenue ....$	5,655,200	$5,167,669
Expenses and taxes....	3,647,361	3,379,342
Operating income	2,007,839	1,788,326
Other income	25,385	15,767
Total income	2,033,224	1,804,094
Charges	1,961,527	1,757,901
Net corporation income	71,697	46,192
P. & L. adj.....	71,697	46,192

CENTRAL STATES ELECTRIC CORPORATION.
(Cleveland Electric Illuminating Co.)

	1914	1913
March gross .....$	384,984	$ 333,667
Net after taxes.....	179,936	158,874
Surplus applied to common stock	104,153	83,320
12 months' gross.....	4,165,652	3,396,379
Net after taxes.....	2,013,842	1,608,060
Surplus applied to common stock	1,185,058	877,794

TEXAS POWER & LIGHT.

	1914	1913
March gross .....$	114,567	$ 83,902
Net after taxes.....	33,622	25,015
Surplus after charges..	7,581	11,959
Twelve months' gross.	1,276,997	1,044,033
Net after taxes.....	454,493	417,053
Surplus after charges..	202,854	291,661
Balance after preferred dividends	92,604	219,736

FORT WORTH POWER & LIGHT.

	1914	1913
March gross	$ 68,165	$ 47,389
Net after taxes.....	35,909	30,419
Surplus after charges..	26,114	23,400
12 months' gross.....	728,785	541,230
Net after taxes.....	425,661	277,981
Surplus after charges.	335,508	212,003
Balance after preferred dividends	278,467	168,603

MT. WHITNEY POWER & ELECTRIC.

	1914	1913
March gross	$ 47,605	$ 37,481
Net after taxes.....	24,700	17,889
Surplus after charges..	13,300	8,764
12 months' gross.....	591,440	457,615
Net after taxes.....	319,940	248,425
Surplus after charges..	198,580	148,925

SAN JOAQUIN LIGHT COMPANY.

The San Joaquin Light & Power Corporation reports for the year ended December 31, 1913, as follows:

	1913	Increase
Gross operating revenue..$	1,741,301	$377,658
Expenses and taxes.....	840,930	*303,229
Net operating revenue..$	900,371	$74,429
Other income	21,019	4,750
Net income .....$	921,390	$79,179
Interest charges	431,288	57,637
Balance .....$	490,102	$21,542

*Decrease.

WESTERN UNION.

	1913	1914
Total operating revenues .....$	6,896,202	$6,754,712
Total operating expenses and taxes.....	5,654,316	5,507,376
Operating income	1,241,886	1,247,336

CITIES SERVICE COMPANY.

	1914	1913
March gross .....$	348,447	$ 136,523
Net after expenses	333,138	130,644
Balance after interest..	307,971	130,644
Balance after preferred dividends	171,138	677,178
Surplus after common dividends	92,662	33,649
12 months' gross.....	2,869,854	1,330,572
Net after expenses.....	2,777,733	1,263,563
Balance after interest..	2,567,171	1,263,563
Balance after preferred dividends .....*	1,438,296	614,492
Surplus after common dividends	836,939	349,104
Total accumulated surplus to March 31.....	2,543,109	.....

*Equivalent to 11.22 per cent on $15,718,380 common stock.

KEYSTONE TELEPHONE.

	1914	1913
March gross .....$	108,386	$103,450
Net	53,975	49,885
Surplus after charges....	28,447	24,326
Three months' gross.....	323,644	310,363
Net	163,112	152,011
Surplus after charges.....	84,764	76,074

WASHINGTON, BALTIMORE & ANNAPOLIS ELECTRIC.

	1914	1913
March gross .....$	57,840	$ 90,360
Net after taxes.....	22,633	55,171
Surplus after charges.....	*2,019	30,194
Three months' gross.....	168,607	190,926
Net after taxes.....	66,315	91,197
Surplus after charges.....	*6,553	19,640

*Deficit.

Cause for large decrease in earnings is that March, 1913, was month of President Wilson's inauguration when traffic was very heavy.

NEW ORLEANS RAILWAY & LIGHT.

The New Orleans Railway & Light Company reports for the year ended December 31, 1913, compare as follows:

Operating Revenues.	1913	1912
Railroad department....$	4,401,152	$4,295,027
Electric department....	1,335,186	1,244,042
Gas department	1,158,095	1,089,078
Total operating revenue	6,894,432	6,628,147
Operating Expenses.		
Railroad department ...$	2,542,886	$2,450,917
Electric department ...	608,046	551,915
Gas department	449,449	417,524
Total operating expenses	3,500,382	3,420,356
Net operating revenue.	3,294,051	3,207,791
Taxes	731,196	565,991
Operating income	2,574,646	2,652,264
Other income	34,763	41,573
Total income	2,609,408	2,683,374
Interest, reserve, etc..	1,731,879	1,688,341
Surplus	*872,759	995,033
Dividends	799,600	799,690
Surplus	73,069	195,343

*Equal to five per cent on $10,000,000 preferred stock and an additional 1.86 per cent on $20,000,000 common stock. This compares with 5 per cent earned on preferred and 2.47 per cent on common previous year.

CLOSING BID PRICES FOR ELECTRICAL SECURITIES IN THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	April 27	April 20
American Tel. & Tel. (New York).....	119	120½
Commonwealth Edison (Chicago).....	133½	135
Edison Electric Illuminating (Boston).....	245	250
Electric Storage Battery, common (Philadelphia).....	49¾	50¼
Electric Storage Battery, preferred (Philadelphia).....	49¾	50¼
General Electric (New York).....	140	144
Kings County Electric (New York).....	120	119
Manhattan Transit (New York).....	1	1
Massachusetts Electric, common (Boston).....	9¼	10
Massachusetts Electric, preferred stamped (Boston).....	58	59½
National Carbon, common (Chicago).....	106	108½
National Carbon, preferred (Chicago).....	119	118½
New England Telephone (Boston).....	135	135
Philadelphia Electric (Philadelphia).....	25½	25½
Postal Telegraph and Cables, common (New York).....	75	81
Postal Telegraph and Cables, preferred (New York).....	67	69
Western Union (New York).....	60	61¼
Westinghouse, common (New York.....	71	72¼
Westinghouse, preferred (New York).....	117	117½

PERSONAL MENTION.

MR. FELIX T. HUGHES, formerly of the Mississippi Valley Trust Company, has been elected a vice-president of the Engineering Securities Corporation.

MR. FREDERICK GREENSLADE, superintendent, the Jamesburg Electric Light & Water Company, Jamesburg, N. J., has tendered his resignation, effective May 15.

MR. RUSSELL G. SCHOEDINGER, for some time a representative with The F. Bissell Company, Toledo, O., is now connected with the National Carbon Company, of Cleveland, O.

MR. J. L. WHITE has been appointed local manager of the Oregon Power Company's office at Portland, Ore., having been transferred from Dallas, Ore., where he held a similar position.

MR. ROBERT MONTGOMERY, manager of the commercial department, Louisville Gas & Electric Company, has recently been elected a member of the local Rotary Club.

SIR WILLIAM MARCONI has reached the age of 40 years, which makes him eligible as an Italian Senator, and it is reported that King Victor Emmanuel intends to nominate him to this office at an early date.

MR. HENRY P. DUBOIS, formerly of J. G. White & Company, has been made a vice-president of the Engineering Securities Corporation. This company has opened new offices at 37 Wall Street, New York City.

MR. P. B. SAWYER, general manager of the Utah Power & Light Company, has been called to New York City in connection with the retirement of the short-time notes of his company which is now in progress.

MR. GEORGE HALE, a well known electrical engineer of Los Angeles, Cal., was married to Miss Grace Osborn, of Topeka, Kans., in the Kansas capital recently. The couple will make their home at Hollywood, a suburb of Los Angeles.

MR. P. D. TUCKETT, president of the Electric Light System, of London, England, is in Kansas City, Mo., for the purpose of aiding in the reorganization of the Kansas City, Mexico & Orient Railroad, a steam line now in the hands of receivers.

SURGEON-GENERAL WILLIAM C. GORGAS, U. S. A., was presented with the Louis Livingstone Seaman medal by the American Museum of Safety on Tuesday evening, April 28, in recognition of his work for health and sanitation in the Panama Canal Zone.

MR. H. C. KUNKEL, division plant superintendent of the Delaware & Atlantic Telephone & Telegraph Company, Trenton, N. J., tendered an address to the members of the Trenton Telephone Society on Thursday evening, April 23, on "Storm Trouble."

MR. HARRY ASKIN, general manager of the Cushing, Okla., Electric Light & Power Company, has been elected general manager of the Cushing Traction Company, just formed in that city. His new duties will not interfere with his position as head of the light and power company.

MR. F. H. HUGHES, selling representative of the Rauch & Lang Carriage Company, of Cleveland, O., is in Salt Lake City, Utah, and will spend the next three or four months there working in conjunction with the Spiker Electric Garage Company, the local Rauch & Lang representatives.

MR. DANA PIERCE, electrical engineer and agent at New York of the Underwriters' Laboratories, Inc., sailed on May 2 for England to visit the recently established London office of the Laboratories, which is engaged in the examination and test of electrical and other goods made in England.

MR. NEWTON W. BOLEN, general superintendent of the Public Service Railway Company, was given a dinner Monday evening, April 20, by the employees of the Montgomery and Bayonne Divisions, at the auditorium of the company, Jersey City, N. J.; 250 guests were present, including Mr. Richard E. Danforth, general manager.

MR. FRANK KOESTER, the well-known consulting engineer and counsel in efficiency movements, is the author of a splendid volume, just published by McBride, Nast & Company, New York, entitled "Model City Planning and Maintenance." The work is imposing in its physical appearance, and bears analysis well. Mr. Koester has brought to the study of this subject a ripe experience, both here and abroad, not only in connection with the engineering phases of the subject, but dealing also with the economic and sociologic aspects of the matter as well.

MR. C. E. VANDEL, assistant treasurer of the Western Electric Company, of Kansas City, Mo., will be a speaker at Merchants' Week to be held by the University of Kansas at Lawrence from May 5 to 7. Mr. Vandel will speak on "Credit." Several thousand retailers from all parts of Kansas are expected to attend the sessions, which will illustrate a modern tendency toward efficiency in storekeeping, as well as other lines of mercantile endeavor. Mr. Vandel, who has been president of the Kansas City Credit Men's Association, will resign at the annual meeting in May, but will give the organization the benefit of his wide experience by continuing as a director.

MR. W. R. GARTON announces the opening of offices at 299 Broadway, New York, where he will conduct a sales engineering business. Mr. Garton has taken the Eastern sales engineering agency for the Root Spring Scraper Company's products, the Nichols-Lintern Company's products, the J. F. Hodgkin Company's products and the W. J. Baker Company's lock washers; also the Monarch Refillable Fuse Company's products. Mr. Garton will continue to represent in an engineering and expert capacity some of the large interests with which he has been associated for some time. He will conduct both an engineering and sales engineering business under the latter general heading.

MR. W. C. COMER, who has been with the Metropolitan Street Railway Company, of Kansas City, Mo., for the past four years, has resigned and will enter the electrical contracting business in that city in the near future. Mr. Comer was assistant superintendent of the Forty-eighth and Harrison streets division at the time of his resignation, which was effective May 1. That division is the most important operated by the company. Mr. Comer has not yet definitely decided on the location of his establishment or the lines to be handled. He has been succeeded as assistant division superintendent by B. B. BOUCHER, who has held the same position at the Tenth and Minnesota division, in Kansas City, Kans. Mr. Boucher's place has been filled by the promotion of C. H. BALES, an inspector.

MR. THORNDYKE HARVEY, who for the past two years was commercial engineer of the Texas Power & Lighting Company, with headquarters at Dallas, Tex., has been appointed commercial agent in charge of all new business for the Kansas Gas & Electric Company, of Wichita, Kans. The Wichita Company has other properties at Independence and Pittsburgh, and smaller subsidiary plants are operated from these points. The company is in a growing territory and the prospects for a good power business are very bright. The industries include flouring mills, coal mines and railroad shops. Four flour mills have already been secured as customers at Wichita, and are now being connected up with a total of 1,200 horsepower. Mr. Harvey states that the organization is in fine shape and that the wheat crop prospect in Kansas was never better.

MR. C. C. CHAPPELLE, vice-president and general manager, Federal Light & Traction Company, New York, has tendered his resignation as executive officer of that holding company taking effect May 1, Mr. Chappelle will hereafter devote his entire attention to private business. Prior to coming with the Federal Company, he was for several years western sales manager of the Westinghouse Machine Company, with headquarters at Chicago. His earlier associations were with the engineering and sales organizations of the Westinghouse companies, subsequent to his graduation from Purdue University in 1895. Mr. Chappelle remains as one of the three members of the Executive Committee of the Kansas City, Clay County & St. Joseph Railway Company, which is not affiliated with the Federal interests.

OBITUARY.

MR. EDWARD R. HARRIS, assistant auditor of the Home Telephone Company, died in Kansas City, Mo., on April 19. Though a product of New Castle, Ind., Mr. Harris came to Kansas City 30 years ago. Most of his business career was spent with the Home Telephone Company.

MR. HENRY ATHERTON GUYON, manager of the Postal Telegraph office in Yonkers, N. Y., for the last three years, died there of pneumonia recently at the age of 55. He had been private secretary to the late Richard Mansfield, the actor, and the late Henry S. Ives. Mr. Guyon left a widow and three daughters.

MR. FREDERICK W. BURDICK, for the last ten years manager of the contracting department of the H. W. Johns-Manville Company, Forty-first Street and Madison Avenue, died April 27 at his home in New York City. He was a member of the Harlem Yacht Club and the Masonic order. Mr. Burdick was 49 years old and a bachelor.

MR. W. T. WESTBROOK, formerly head of the Delaware & Atlantic Telephone Company, died at his home at Philadelphia, on April 22. Mr. Westbrook was a pioneer telephone man, and before that a telegrapher, and member of the old military telegraph corps during the Civil War. He was a fine gentleman of the old school, who numbered among his host of friends and acquaintances who deplore his demise, many men prominent in the electrical industry.

DATES AHEAD.

Electrical Supply Jobbers' Association. May meeting, Chalfonte Hotel, Atlantic City, N. J., May 12-14. General secretary, Franklin Overbagh, 411 South Clinton Street, Chicago, Ill.

American Institute of Electrical Engineers. Annual meeting, New York, N. Y., May 19. Secretary, F. L. Hutchinson, 29 West Thirty-ninth Street, New York City.

Association of Railway Telegraph Superintendents. Annual meeting, New Orleans, La., May 19-22. Secretary, P. W. Drew, 112 West Adams Street, Chicago.

Southwestern Electrical and Gas Association. Annual meeting, Galveston, Tex., May 20-23. Secretary, H. S. Cooper, Dallas, Tex.

Cleveland Electrical Exposition. May 20-30. Manager, William G. Rose, Wigmore Coliseum, Cleveland, O.

Missouri Electric, Gas, Street Railway and Waterworks Association. Annual convention, on board steamer *Quincy* en route from St. Louis to Keokuk, Iowa, and return, May 21-23. Secretary, F. D. Beardslee, Union Electric Light & Power Company, St. Louis, Mo.

National District Heating Association. Sixth annual convention, Rochester, N. Y., May 26-28. Secretary, D. L. Gaskill, Greenville Electric Light & Power Company, Greenville, O.

Indiana State Electrical Contractors' Association. Convention, Indianapolis, Ind., May 28-29.

American Institute of Electrical Engineers. 296th meeting, Pittsfield Mass., May 29.

National Electric Light Association. Annual convention, Bellevue-Stratford Hotel, Philadelphia, Pa., June 1-5. General secretary, T. C. Martin, 29 West Thirty-ninth Street, New York, N. Y.

Oregon Electrical Contractors' Association. Annual meeting, Portland, Ore., June 8-9. Secretary, J. C. Green, Portland, Ore.

Michigan Section, National Electric Light Association. Annual convention cruise leaving Detroit, June 17, for the Thousand Islands and intermediate points, returning June 20. Secretary, Herbert Silvester, 18 Washington Boulevard, Detroit, Mich.

American Institute of Electrical Engineers. Thirty-first annual convention, Cadillac Hotel, Detroit, Mich., June 22-26.

With the Electrical Manufacturers

The Koerting & Mathiesen Company, New York, N. Y., announces its removal to 49-53 East Twenty-first Street.

A. F. Daum & Company, Pittsburgh, Pa., has ready for distribution booklet No. 17, describing and illustrating the Daum refillable cartridge fuses for electric light and power circuits.

The Automobile Supply Manufacturing Company, Brooklyn and New York, has issued a circular describing "Apollo" electric horns. These horns are intended for use on automobiles and give a loud but agreeable sound.

Duncan Electric Manufacturing Company, Lafayette, Ind., has issued bulletin 25 on induction-type watt-hour meters. This bulletin describes the entire construction of the meters. Numbers of illustrations are shown and a table of list prices is given.

The Packard Electric Company, Warren, O., has issued a flyer on porcelain-clad bell-ringing transformers. The transformer, which is entirely enclosed in a porcelain case, is suitable for residence door bells, buzzers and all classes of light signal work.

Norton & Bird, Chicago, Ill., announce that they have moved to permanent headquarters in the Harris Trust Building, 111 West Monroe Street, where they will continue their practice as consulting engineers, with special reference to public-service properties.

The Dubilier Electric Company, Incorporated, New York, N. Y., announces that it has moved to new quarters located at 80 Fifth Avenue. The company has largely increased its facilities and will be able to make very prompt shipments, as an enlarged stock of parts and material will be constantly available.

Hanovia Chemical & Manufacturing Company, Newark, N. J., announces that it is now manufacturing pure transparent quartz-glass apparatus of all descriptions for electrical and other devices. It is said that this is the first time that this material has been manufactured in this country. The company manufactures Heraens electric furnaces and quartz lamps.

Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has secured the contract for the equipment of the new hydroelectric plant which the Southern Power Company is building at Lookout Shoals on the Catawba River in North Carolina. This plant will develop about 26,000 horsepower. The equipment contract calls for an expenditure of about $225,000.

Eastern Electric Lamp Company, Hartford, Conn., has recently issued a catalog giving prices and details of those classes of incandescent lamps employed for ordinary illumination. The catalog covers Gem lamps, round, straight and tubular-bulb types of Mazda lamps for parallel operation, concentrated-filament Mazda automobile lamps, and Mazda series-street-lighting lamps.

Cooper Hewitt Electric Company, Hoboken, N. J., announces that the St. Louis, Mo., office has been removed from 1403 Central National Bank Building to suite 1201, the same building. This office and territory will be in charge of E. H. Waddington, the well known illuminating engineer, who was formerly connected with the General Electric Company and the Western Electric Company.

Metropolitan Engineering Company, New York, N. Y., has recently issued a number of loose leaves for its loose-leaf binder. These sheets cover meter-protective and testing devices, service cutouts, fuses, switches, charging plugs and receptacles, etc. Section No. 8 of the loose-leaf binder which is devoted to primary cutouts, fuses, transformer cutouts and high-tension series-arc-lamp cutouts, has been completely revised.

Cutler-Hammer Manufacturing Company, Milwaukee, Wis., recently issued a bulletin on push-button-operated controllers for printing machinery. This bulletin covers various types of speed regulators for printing presses, job presses and similar service. Dynamic-braking speed regulators are also described. By means of inching buttons the pressman can easily move the press a fraction of an inch when threading paper and preparing the press for a run. A number of installations are shown, and price lists, dimensions, etc., are included.

General Electric Company, Schenectady, N. Y., has recently issued a celluloid indicator, showing the effect of operating Mazda lamps above or below labeled voltages. This indicator gives the per cent of rated wattage, the per cent of rated candlepower and the per cent increase or decrease in the total cost of light for operating voltages of from 96 to 104 per cent of the rated lamp voltage. This indicator shows clearly that undervoltage operation of lamps results in an increased cost of light to the consumer and a loss of revenue to the central station.

James Clark, Jr., Electric Company, of Louisville, Ky., is filling its contract with the United States Government for a number of electrically driven tools to be installed on the new torpedo-boat tender No. 2, known as the Melville. The first shipment of these tools was recently made to Norfolk, Va., where the vessel is being put into commission. All these tools are driven by direct-connected motors and are similar to those which the company has sold for use in government shops. The shipment consisted of three 22.5-inch drills; two 16-inch sensitive drills; two floor grinders; one buffer; two shop saws; one small, portable radial drill and two center grinders.

National X-Ray Reflector Company, Chicago, Ill., has recently issued a portfolio of details and data on illumination from concealed sources. This portfolio is bound in a strong cover 12 by 5 inches and contains 52 pages, together with 24 loose detail plates. Many prominent installations of every conceivable kind and class are described with data. Methods of calculating

installations of the indirect type, show-window type, and direct type are given. Tables, rules and charts are presented in a simple form, which ought to facilitate the laying out of an interior lighting installation. This portfolio is complete in all respects, covering installations for offices, hotels, banks, libraries, stores, schools, churches, hospitals, residences, etc. The portfolio retails at $5.00 per copy; a limited number of complimentary copies, however, will be mailed to responsible members of architectural firms requesting the same.

Sprague Electric Works of General Electric Company has recently issued bulletin No. 41010 devoted to a description of direct-current motors, types C and D. These motors are of the commutating-pole type and are adapted for floor, wall or ceiling mounting. A number of interesting installations are shown and tables of dimensions are given. Pamphlets Nos. 853 and 330 have also been issued. The former is devoted to a description of laboratory ozone apparatus. This pamphlet covers laboratory ozonators, motor-generator sets for supplying the necessary alternating current when not available, ozone mixers for subjecting oil to ozone treatment, air filters and industrial ozonators. Pamphlet No. 330 lists and describes direct-current and alternating-current General Electric and Sprague-Lundell fans of the non-oscillating, oscillating and telephone-booth types. Ceiling fans and ventilating fans are also included.

National Lamp Works of General Electric Company, Cleveland, O., has recently issued bulletins Nos. 11B and 13D, devoted to nitrogen-filled series street lamps and multiple lamps respectively. In bulletin No. 11B Mazda nitrogen-filled series street lamps are listed in sizes ranging from 80 to 1,000 candlepower, the efficiencies varying from 0.71 to 0.50 watt per mean horizontal candlepower. These lamps will operate satisfactorily on any series circuit where the current is kept reasonably constant at the value for which the lamps are rated. Owing to the high intrinsic brilliancy of these lamps and the high temperatures of the bulbs, reflectors and globes are recommended. A line of reflectors and globes suitable for these lamps is illustrated and described in the bulletin. Cuts of the new lamps, characteristic curves, distribution curves and operating data are also included. The last two pages of the bulletin are devoted to practical information designed to serve as a guide in selecting lamps. Bulletin No. 13D describes the 750 and 1,000-watt multiple lamps having efficiencies of 0.65 and 0.60 watt respectively and operating on 110 to 113 volts. These lamps are designed to operate satisfactorily on even poorly regulated circuits provided the voltage rating of the lamp corresponds to the average socket voltage used. It is recommended that inclosing globes or indirect fixtures be used owing to the high intrinsic brilliancy of the lamps. Suitable fixtures for these lamps are described in the bulletin, proper attention being paid to ventilation. Characteristic curves and numerous cuts add to the value of the bulletin. A table is given comparing the color composition of the new lamps with that of sunlight. Owing to the similarity of the light from these lamps to daylight, they are recommended for photographing purposes. They are also recommended for high-ceiling stores, auditoriums, armories, railway depots and outdoor illumination.

Record of Electrical Patents.

Issued by the United States Patent Office, April 21, 1914.

1,093,594. Phase Balancer. Ernst F. W. Alexanderson, assignor to General Electric Co. Comprises a synchronous dynamo connected to another dynamo, the phase rotation of the two being opposite.

1,093,596. Electric Block-Signal Apparatus. J. Beaumont and F. G. White, Chicago, Ill. An automatic signal for side tracks.

1,093,597. Electric Block-Signal Apparatus. J. Beaumont and F. G. White. A modification of 1,093,596.

1,093,598. Spark Plug. C. W. Beck, assignor to Michigan Motor Specialties Co., Detroit, Mich. For internal combustion engines.

1,093,607. Junction Box for Electrical Conductors. C. W. Davis, assignor to Standard Underground Cable Co. Has inclosed cartridge fuses. (See cut.)

1,093,614. Brush for Dynamo-Electric Machines. E. G. Gilson, assignor to General Electric Co. Graphite brush containing copper and iron.

1,093,615. Circuit for Electric Lighting or Power. M. H. Gray, Springfield, O. Means for controlling floating storage battery.

1,093,618. Automobile Lamp. W. S. Hamm, assignor to The Adams & Westlake Co. Contains incandescent lamp.

1,093,621. Indicator. A. B. Hazard, Chicago, Ill., assignor of one-half to R. E. Humpston. Has oscillating arm.

1,093,631. Automobile Drive. H. H. Kennedy, assignor to Waverley Co., Indianapolis, Ind. Electric motor geared to shaft.

1,093,634. Brush Holder. A. Krauss, assignor to The Firm of Robert Bosch, Stuttgart, Germany. Includes means for limiting brush movement.

1,093,650. Electric Generator or Motor. W. Rodgers, Hamilton, Ontario, Canada. A dynamo frame having dovetailed plates.

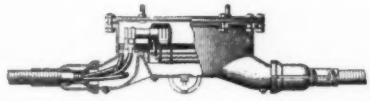
1,093,659. Internal-Combustion Engine. F. S. Thornley, Clarion, Iowa. Has electric ignition.

1,093,660. Pressure Governor for Pumps. W. V. Turner, assignor to The Westinghouse Air Brake Co. Has electromagnetically controlled valves.

1,093,670. Motor-Control System. M. A. Whiting, assignor to General Electric Co. Contactor arrangement having magnetically operated circuit-breaker.

1,093,679. Auxiliary Alarm System. C. E. Beach, assignor to G. O. Knapp, New York, N. Y. Has magnetically controlled signal train.

1,093,702. Relay. I. Kitsee, assignor



1,093,607.—Junction Box.

to American Telephone and Telegraph Co. Closed magnetic yoke has a number of magnetic poles with fixed and movable coils.

1,093,717. Rectifier of Electric Currents. Thomas J. Murphy, Rochester, N. Y. Has automatically controlled resistance.

1,093,725. Attachment for Telegraph Apparatus. L. C. Page, Decoto, Cal. Has mechanical connection between relay and sounder.

1,093,744. Spark Plug. J. F. Tracy, Chicago, Ill. Has gap in center electrode.

1,093,745. Liquid-Level Indicator. J. A. Turner, Washington, D. C. Circuits to incandescent lamps completed through liquid in tube.

1,093,780. Relay Bond. W. K. Howe, assignor to General Railway Signal Co., Gates, N. Y. For track signal system.

1,093,791. Electric Flat Iron. C. P. Madsen, assignor to The Michigan Stove Co. Switch comprises part of handle.

1,093,792. Armored Electric Heating-Unit. C. P. Madsen, assignor to The Michigan Stove Co. Has a fibrous fireproof insulating covering permeated with refactory insulating material.

1,093,793. Electric Switch. J. F. McElroy, assignor to Consolidated Car-Heating Co. Spring-operated switch.

1,093,794. Telephone Signal System. J. Meyerhoff, Chicago, Ill. Electric signal lamp for each station.

1,093,801. Signal System. G. W. Phelps, Chicago, Ill. A bell and lamp signalling circuit.

1,093,809. Lock Construction. H. G. Voight, New Britain, Conn. Hs electric indicating device.

1,093,857. Electric Igniting Device for Explosive-Engines. L. C. Jackson, Buffalo, N. Y. Mechanical device for operating ignition means.

1,093,875. Electromagnetic Separator. B. T. Mottinger, Youngstown, O. Field magnet has cored passageway for material to be separated.

1,093,888. Current-Amplifying Apparatus and Circuits. H. E. Shreeve, assignor to Western Electric Co. A microphonic repeater.

1,093,893. Mounting for Fuses. Clarence G. Stoll, Brooklyn, N. Y., assignor to Western Electric Co. Fuse held inside of porcelain cell.

1,093,912. Wheel Mount. F. E. V. Chapman, Asbury Park, N. J., assignor of one-fourth to Durand, Ivins & Carton, Asbury Park, N. J. For trolley wheel.

1,093,926. Signaling System. R. H. Gaylord, and G. B. Capps, assignors to Foulkes-Gaylord Company, Los Angeles, Cal. Lamp arrangement to show movement of cars.

1,093,947. Unit and Process of Mak-

ing The Same. M. H. Rice, New Rochelle, N. Y., assignor to National Electric Utilities Corporation, New York, N. Y. Has covering of cementitious material.

1,093,951. Case and Cap for Telephone Receivers. L. Steinberger, Brooklyn, N. Y. Special provision made for securing diaphragm.

1,093,955. Combination Sash - Lock and Alarm. J. Tregoning, New Haven, Conn. Has electric-bell alarm.

1,093,957. Electrode. E. Weintraub, assignor to General Electric Co. Contains calcium cyanamid, titanium oxide and carbon.

1,093,967. Insulating Compound. L. E. Barringer and F. C. Zapf, Schenectady, assignors to General Electric Co. China wool oil, pitch and asphalt.

1,093,968. Electric Furnace. R. S. Bicknell, New York, N. Y. Of resistance type, with resistors arranged so as to permit of several connection schemes.

1,093,972. Wire-Connector. W. G. Cady, Middletown, Conn. Has movable plates inside insulating case. (See cut.)

1,093,983. Repulsion-Motor Control. F. Eichberg, assignor to General Electric Co. Has inductance and resistance shunted around brushes.

1,094,000. Coin-Controlled Telephone Pay-Station. G. A. Long, assignor to The Gray Telephone Pay Station Co., Hartford, Conn. Includes means for indicating weight of coin used.

1,094,030. Electric Fuse. S. D. Sprong and W. E. McCoy, New York, N. Y., assignors of one-third to F. W. Smith. Has U-shaped fuse strip and three terminals.

1,094,036. Fuse Plug. S. Terada, Seattle, Wash. Tube of non-conducting material inserted in plug. (See cut.)

1,094,051. Ignition Device. J. Berg, assignor to Metal Specialties Manufacturing Co., Chicago, Ill. An ignition device having a cup shape.

1,094,077. Variable-Speed Dynamo. H. Leitner, London, England. A shunt dynamo having one separate field brush to add to strength of field at low speeds.

1,094,083. Electric Sign. A. C. Meyer, San Diego, Cal. A sign-changing device utilizing a movable stencil.

1,094,102. Repulsion-Motor. A. Simon, Milwaukee, Wis. Armature sectionalized to permit of varying speed.

1,094,103. Automatic Block-Signaling System for Electric Railways. O. E. Stevens, assignor to General Railway Signal Co. Inductive bonds sectionalize tracks.

1,094,104. Automatic Block-Signaling System for Electric Railways. O. E. Stevens, assignor to General Railway Signal Co. A modification of 1,094,103.

1,094,106. Electromagnetic Fishing Tool. C. N. White, Maricopa, Cal. Has a number of electromagnets.

1,094,109. Conduit. C. J. Alpaugh, assignor to The Trenton Electric and Conduit Co., Trenton, N. J. Metal molding with capping.

1,094,121. Resistance Unit for Controllers. H. W. Cheney, assignor to Allis-Chalmers Mfg. Co. Has superimposed resistance units and staggered ventilating holes.

1,094,125. Magnetic Separator. R. W. Cousins, Chicago, Ill. Poles of rotating magnets pass near belt.

1,094,137. Contact Shoe Device for Third-Rail Systems. H. S. Farquhar, Bryn Mawr, Pa. Toggle arrangement for controlling shoe.

1,094,141. Process of Electric Welding. G. Gnüchtel, Lauter, Germany. Layer of high welding heat between electrodes and material to be melted.

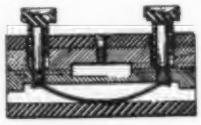
1,094,156. Battery Regulator. E. Lowe, assignor to General Acoustic Co., Jamaica, N. Y. Adjustable resistance fits over top of dry cell.

1,094,165. Apparatus for Reproducing Vibrations of Small Amplitude. A. Orling, Tooting, London, England. Fluid-operated relay.

1,094,170. Bell Ringer. J. E. Scovill, Chicago, Ill. Has electromagnet.

1,094,173. Battery Terminal. J. M. Skinner, Philadelphia, Pa. For storage battery.

1,094,206. Pull Socket. C. R. Hare, Hartford, Conn., assignor to The Arrow Electric Company, Hartford, Conn. Covers detail.



1,093,972.—Wire Connector.

1,094,224. Process for Producing 1.3 Diols. L. P. Kyriakides and R. B. Earle, assignors to Hood Rubber Co. Electrolytic reduction of ketone alcohols in dilute sulphuric-acid solution.

1,094,238. Electrically Driven Pendulum. G. Nobis, Davenport, Iowa. Movement of pendulum closes and opens circuit of operating magnet.

1,094,264. Heating Unit. C. S. Steward, Chattanooga, Tenn. Resistance wires in parallel slots provided with air passages.

1,094,292. System for Operating or Controlling Time-Indicating Devices. L. J. Aron, assignor to X. L. Electric Co., London, England. Includes means for giving magnetic impulses to clocks at predetermined intervals.

1,094,036.—Fuse Plug.

1,094,315. Process for Producing 1.3 Glycols, R. B. Earle and L. P. Kyriakides, assignors to Hood Rubber Co. Aldol reduced by electrolytic action in presence of sodium bicarbonate and mercury cathode.

1,094,316. Process for Producing 1.3 Glycols. R. B. Earle and L. P. Kyriakides, assignors to Hood Rubber Co. A modification of 1,094,315 employing 1.3 ketone alcohols.

1,094,354. Electric Furnace and Process of Heating Substances. E. F. von Wilmowsky, assignor to Mrs. O. Pieper, Potsdam, Germany. Has parallel electrodes one of which is surrounded by the other and solenoid turns surrounding the latter.

1,094,355. Electric Furnace and Process of Heating Substances Uniformly and at a Controllable Temperature. E. F. von Wilmowsky, assignor to Mrs. O. Pieper, Potsdam, Germany. Has electric arc and magnetic field through which gases pass.

1,094,356. System of Automatic Block-Signaling for Electric Railways. S. M. Young, New York, N. Y. Track-operated alternating-current signal with auxiliary magnetically controlled direct-current circuit.

1,094,371. Process for Extracting Metals from Ores. H. S. MacKay, Norwich, Conn., assignor to MacKay Process Co., Norwich, Conn. Electrolytic method embodying means for maintaining high efficiency of solvent and electrolyte.

1,094,381. Electric Furnace for and Process of Heating Substances Uniformly and at a Controllable Temperature in an Electric Arc. E. F. von Wilmowsky, assignor to Mrs. Olga Pieper, Potsdam, Germany. Has concentric electrodes with intermediate furnace chamber, the whole being surrounded by a solenoid.

1,904,389. Electric Motor. W. K. Howe, assignor to General Railway Signal Co. Has dustproof chamber for rotor.

1,094,407. Means for the Regulation or Control of Railway and Like Traffic. H. von Kramer, Edgbaston, Birmingham, England. Signal device on cars has inductive relation to track signaling circuit.

Patents Expired.

The following United States electrical patents expired April 27, 1914.

581,263. Electrical Connection. H. P. Brown, New York, N. Y.

581,281. Underground-Trolley Conduit. J. D. Griffen, New York, N. Y.

581,283. Secondary Battery. V. M. Harris, Chicago, Ill.

581,298. Registering Mechanism. W. H. McFall, Philadelphia, Pa.

581,327. Electric Gas-Lighter. L. L. Borradaile, Philadelphia, Pa.

581,340. Magneto-Electric Machine. E. B. Cutten, Atlantic Highlands, N. J.

581,350. Telephone Instrument. J. E. Keelyn, Chicago, Ill.

581,366. Electric Generator. C. C. Poole, Evanston, Ill.

581,368 Support for Electric Railway Conductors. E. D. Priest, Schenectady, N. Y.

581,406. Telephone Receiver. W. J. Morton, New York, N. Y.

581,411. Printing Telegraph. J. Burry, Long Island City, N. Y.

581,426. Primary Battery. R. R. Moffatt, Brooklyn, N. Y.

581,430. Semaphoric Electric Signal. R. S. Roberts, Philadelphia, Pa.

581,446. Electric Call. H. C. West, New York, N. Y.

581,455 and 581,456. Mounting for Fuses. W. W. Dean, St. Louis, Mo.

591,460. Electric Fuse. W. E. Harrington, Philadelphia, Pa.

581,465. Revolving Electric Headlight. J. Kirby, Jr., Dayton, O.

581,528. Electrical Alarm Device. J. J. Barton, Ypsilanti, Mich.

581,544. Thermostatic Fire-Alarm. O. A. Enholm, and Thomas H. Beck, New York, N. Y.

581,557. Controller for Electric Cars. S. W. Huff, Baltimore, Md.

581,561. Selective Signal for Telephone Circuits. H. W. Mason, New Bedford, Mass.

581,658. Electric Motor Controller. W. H. Chapman, Portland, Me.

581,684. Electrical Transmission of Power. R. M. Hunter, Philadelphia, Pa.

Electric Vehicle Section

Philadelphia Section, Electric Vehicle Association, Discusses Garaging.

The April meeting of the Philadelphia Section of the Electric Vehicle Association of America was held on April 8, at 226 South Eleventh Street, Philadelphia, Pa., Chairman R. L. Lloyd presiding; 52 members and guests were present.

The three main papers of the evening formed a symposium on the care of cars in electric garages. The subject was divided into three parts, J. C. Bartlett covering the subject of trucks as cared for in public garages; C. A. Haines speaking more particularly of passenger cars, and Wm. Elwell describing in detail the care of the Philadelphia Electric Company's cars in its own garage.

A resolution was adopted instructing the secretary to convey to the proper official of the state a communication stating that it was the sense of the Philadelphia Section of the Electric Vehicle Association of America that the record of automobile licenses should be so kept as to differentiate between electric cars and gasoline cars, and also if possible between passenger cars and commercial vehicles. It was explained that any additional labor in so keeping the records would be very light indeed, and the information thus secured would be very valuable for statistical reasons. The chairman read a clipping and made some statements in reference to the work of the committee appointed to promote the use of electric vehicles in the parcel-post service. Attention was also called to the formation of a Washington Section, a Cincinnati Section and the probable formation of a New Orleans Section. There were displayed for inspection two signs which have been adopted by the Association designated "Electric Garages" and "Electric Charging Stations"; also a sample was shown of the standard charging plug and its structure described.

The first paper of the evening was read by Mr. Bartlett, in opening which he explained the interrelations existing between the owner of the vehicle, the garage and the maker of the car. He explained that the maker exhausted every effort to produce a perfect car, and that it is sold under the statement of being "fully guaranteed for a year," or for life, and that it requires practically no attention, and that any one can get perfect results. He then went on to say substantially as follows:

We all speak English, of course, but every art, every branch of science or trade has its own language, and while the salesman has told the truth, he has told it in a language that the new owner does not comprehend. "Fully guaranteed" means simply that defective parts will be repaired. "Practically no attention" means just *that*, when compared to that eternal vigilance which is the price of service on a gasoline motor.

Even though very simple, the electric car is a piece of machinery, just the same, and even a wheel-barrow will squeak if it is not oiled. It must have some attention. The maker delivers the car to the owner, and it is consigned to the tender care of anyone who gets a rectifier and puts out the sign "Electric Cars Charged." Unless the electric garage receives a price commensurate with the service expected, it cannot render the service. Unlike the gasoline car, the electric car is not profitable to the garage; there are few of the supplies or repairs on which the average garage makes a big profit to offset the deficit of storage. It is a prime requisite in any electric garage that a competent night man be employed, and unless such a man is employed, it is a moral certainty that batteries will not receive the attention which they should.

Mr. Bartlett called attention to the fact that the owner or driver of the car knows exactly to what use the car has been put for the day, and has a general idea of what it will be expected to do tomorrow, so that if he would take the trouble to give some few directions or explanations to the garage man, better co-operation could be secured for economical results. Lacking such directions or explanations, the garage man has to use his best judgment, and make a very careful examination to see what is needed for the car and if not in the habit of always giving a full charge, make a guess as to what will be needed for the next day from past experience. Mr. Bartlett stated that the automobile agent is always glad to be able to say that the garage will charge a flat rate for the care of the car. It makes it much easier for him to make a sale when he can state that the cost for a car will be just so much per month. Have we heard of any one making such an arrangement for a gasoline car? And yet it would be just as reasonable to expect it. Some cars will use not over $4 worth of current in a month, while others will use as high as $65 worth in a month. Although it would be easy to make an average as to the charges for a car, it would be entirely unfair to make the one man pay so much more than he actually gets the use of, while the other man profits by the small user.

Mr. Bartlett said that "a truck is the most pleasant boarder that a garage can have; it is with you twelve months in the year, and while the profit made on this car is not large, yet it remains steady, and we believe that special inducements should be made by all garages to attract fleets of trucks. Not the least of these inducements is service. In order to charge batteries properly and be sure that the men pay strict and particular attention to this branch of the work, and at the same time procure a record from which the bookkeeping department can make up the bills, we have adopted a card record, one of which is filled out for every charge put in any battery. It is therefore possible for us to go back any reasonable length of time and recite to you the entire history of the battery day by day. This method insures careful charging, as well as accurate bills for the service rendered." Following his paper a number of slides illustrating various features of the electric garage were shown.

The next paper was read by Mr. Haines. He called attention to the fact that the garage owner must work for two masters, the owner of the car and the agent, and inasmuch as a man cannot serve two masters, there is trouble to be looked for at the outset. Like the other speaker he called attention to the glowing terms in which the vehicle agent speaks of the car, its simplicity and the freedom from trouble which one is liable to have. The owner, of course, gets the impression that nothing will ever happen to interfere with his operation, and on some occasion when he gets stuck after a run of a number of miles less than the guaranteed amount, he immediately calls on the agent to explain why. The agent naturally blames the garage man, without ever looking into the conditions, which are responsible on this particular occasion. He said it was very difficult to

so charge the car so as to get the mileage to suit the agent, and yet keep the bill for current low to suit the owner. He also called attention to the necessity of a high-class man in charge of this branch of the garage work, and said it was difficult to find such men.

Mr. Haines then explained the operation of the inspection system which has been inaugurated by his firm whereby all of the Baker cars get free inspection once a month. By this method, they not only keep in touch with all of their own cars in the Philadelphia territory, but by preventing trouble and catching any minor troubles in time they avoid larger troubles and get better results. They have found this scheme very satisfactory, and recommend other agents to adopt a similar system.

Mr. Elwell then followed with his paper, which was a description of the equipment and care of the 44 electric vehicles owned by the Philadelphia Electric Company. Detailed explanation was given of the way the records are kept for each car and each battery, and a set of forms on which these records are kept was exhibited. It showed that by this method the highest efficiency was secured from each of the cars; they were kept on the street for a larger percentage of time and the up-keep cost was reduced to a minimum. All these records were compiled monthly, and a fixed charge per mile was made against each vehicle. Tires, batteries and general repairs were thus kept track of and a complete history of each car and each wheel was available at any time.

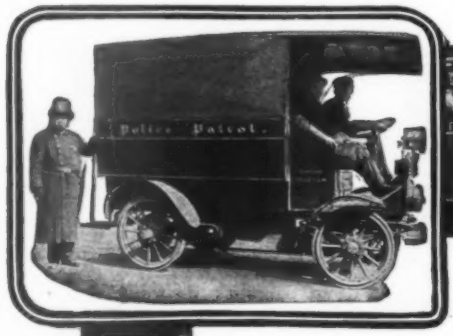
In the open discussion that followed the presentation of the three papers, F. E. Whitney gave a review of the work and recommendations of the Garage Committee in Chicago, wherein it suggested that the old method of a flat rate per month be done away with, and a method substituted by which charges are made for the various branches of the service rendered. Further discussion was entered into by Messrs. Kalas, Smith, Metcalf, Fredericks and others.

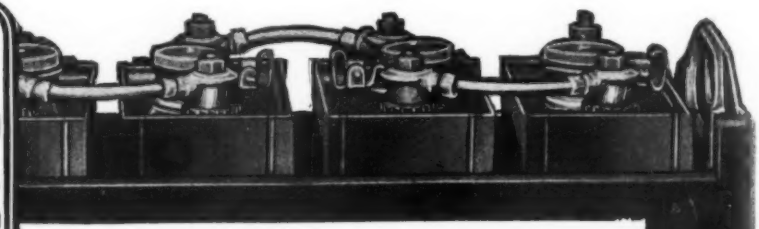
General Vehicle Wagons for Postal Transfer.

The Postal Transfer Service, Inc., a company that has contract for haulage of some of the mail on Manhattan Island, New York City, has purchased 20 two-ton General Vehicle wagons, which will be utilized in the general work of the concern. The contract has been made and the machines will be delivered as rapidly as they can be completed. This company succeeded to the business of the New York Mail Company, which had contract for the work for a considerable period, and the demands have been very much increased by the inauguration of the parcel post division of the postal service. The company was organized in the spring of last year and the bid made for what is officially known as route 407,012, was accepted in September.

The company has contract to haul all the mail between the general postoffice and the branches and the railroad terminals south of Forty-second Street, it being divided into three classifications. The "mail-messenger" class entails the haulage of the incoming European mail between the receiving pier and the general postoffice and the receiving pier and the outgoing railroad terminals, handling all of the mail brought into the city of this class; the "transfer" class is the haulage between the railroad terminals, this requiring trips to Jersey City, and the "station" class is the haulage between the general postoffice and the branch stations. This does not include the collection of mail at the substations or at the plants of individual concerns.

The firm began business with 80 two-ton and 20 one-ton gasoline machines, this including some of the equipment of the company that it succeeded, and the 20 wagons just bought will re-





18,529 Miles a Year

and Less Than $1 per month Battery Maintenance. From Service Report, Year Ending December, 1913, on Edison Battery—Detroit Electric Police Patrol Wagon operated by City of Memphis, Tenn.

Number of Runs	**5,166**
Number of Miles	**18,529**
Cost of Tires, Chains, Grease, etc	**$275.30**
Cost of Battery Solution (Total Battery Maintenance)	***11.92***
Total Maintenance	**$287.22**

The Edison Alkaline Storage Battery in this kind of Service is guaranteed to be capable of developing **100 per cent** of its rated capacity at the end of **four** years.

Send us the name of your Commissioner of Fire and Police.

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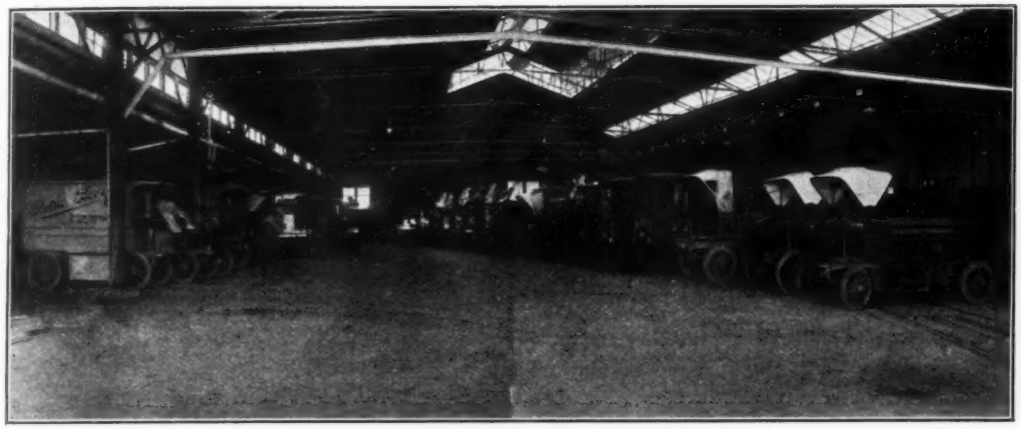
Take Philadelphia for Instance—



This photograph was taken in the Shipping Department of the brewery of F. A. Poth & Sons, Philadelphia. This company has 39 electric trucks, 21 of which are equipped with "Ironclad-Exide" Batteries and two with "Exide" Batteries.

The Philadelphia Electric Co. operates a fleet of 44 electric delivery wagons and trucks, 23 of which are equipped with "Ironclad-Exide" and 21 with "Exide" Batteries.

The Bergdoll Brewing Co. has 14 electric trucks, and C. Schmidt & Sons Brewing Co., of Philadelphia, 10 electric trucks; equipped with batteries of the "Exide" types.

John Wanamaker, Strawbridge & Clothier and Gimbel Bros., the three largest department stores in Philadelphia, have 12 electric vehicles, 11 of which are equipped with batteries of the "Exide" types.

The Curtis Publishing Co., publisher of the "Ladies' Home Journal" and the "Saturday Evening Post," uses "Ironclad-Exide" Batteries, having 12 electric trucks equipped with them.

The Union Transfer Co., The United Gas Improvement Co., and the Finkenauer Brewing Co., are other large users of "Electrics" in Philadelphia, using batteries of the "Exide" types.

Philadelphia has hundreds of other electric vehicle users—both commercial and pleasure—who have equipped their cars with either "Exide" "Hycap-Exide" "Thin-Exide" or "Ironclad-Exide" Batteries.

It will pay Central Stations to use and endorse the four "Exide" Batteries.

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of The "Chloride Accumulator", The "Tudor Accumulator", The "Exide", "Hycap-Exide", "Thin-Exide" and "Ironclad-Exide" Batteries

New York Boston Chicago **PHILADELPHIA, PA.** Denver San Francisco Seattle
St. Louis Cleveland Atlanta Detroit **1888-1914** Rochester Los Angeles Portland, Ore. Toronto
886 "Exide" Distributors 9 "Exide" Depots "Exide" Inspection Corps

place a similar number that has been in service until no longer dependable. The company expects that it will be necessary to increase its equipment to 1,250 vehicles to take care of the business. The electric vehicles were purchased after inquiry into the service of the Motor Delivery Company, which has the contract for haulage of the mail north of Forty-second Street on Manhattan, to 180th Street on the west side and to Fordham on the east side of the city, and since 1909 has used from 22 to 28. In 1913 the company's machines were driven a total of 336,000 miles in 304 days. The haulage is to and from branch postoffices and the Forty-second Street terminal. The company originally took over a horse-vehicle contract and utilized electric machines, and has continued its service with them, using no less than 14 of these for parcel post work.

The Postal Service Transfer has established a garage at First Avenue and Forty-second Street, where the electrics will be stored when not in use. The president of the company is H. Rowley and J. J. Cassidy is the vice-president and in charge of the operating.

Few Auto Measures Enacted Into Law.

While there is always an apprehension regarding restrictive measures about to be enacted into law by the various state legislatures, affecting the free use of automobiles and the city and country streets and highways, the report recently issued by the American Automobile Association should afford some relief. This report shows the status of motor vehicle and highway legislation at approximately the present time.

Of ten legislatures convened, eight have adjourned. These are New York, New Jersey, Maryland, South Carolina, Virginia, Ohio, Kentucky and Mississippi. The Massachusetts session will continue another month or two, and Rhode Island one month more. The only other regular sessions will be in Georgia, to convene June 27, and in Louisiana, to convene May 11.

Record of bills up to the middle of April is as follows:

State	No. of bills Introduced Sen.	House	Bills Pas'd	Bills Sign'd	Bills Ret'd
Kentucky	5	9	1	1	..
Maryland ...	6	16	3	3	..
Massachusetts	6	42	4	4	..
Mississippi ..	3	4	2	2	..
New Jersey.	9	15	4	3	1
New York...	15	18	3	2	1
Ohio	..	..	1	1	..
Rhode Island	5	6	3	2	..
So. Carolina.	3	5	2	2	..
Virginia	8	8	4	3	1
	59	123	27	23	3

No drastic or very objectionable measure has been enacted in any state, but a number of bills approved by automobilists have become law. Massachusetts, New York and Rhode Island have adopted measures requiring lights on all vehicles at night.

Of fourteen bills in Kentucky, some very bad, only one got through. It is a general measure, which, as amended, fixes registration fees for motorcycles at $5, cars of 25 horsepower and less $6, of 25 to 50 horsepower $11, and of more than 50 horsepower $20.

In Maryland the only important new law regulates speed of motor vehicles, prohibiting speed exceeding thirty-five miles an hour, and limits trucks weighing four to eight tons, with load, to fifteen miles an hour, those weighing more than eight tons to twelve miles and traction engines to six miles. It limits width to 90 inches, gross weight to fourteen tons and weight per inch of tire to 800 pounds.

New laws in Massachusetts prohibit use of muffler cut-outs, relate to garages in Boston and grant privileges to non-resident motorists. Forty-eight bills were introduced.

New York passed a bill making it a misdemeanor to violate traffic rules in New York City, but a bill to include motorcycles in the motor vehicle law, which passed both houses, was vetoed April 13.

Only one bill of general importance got through in New Jersey. It authorizes park boards to limit the speed of motor vehicles and even to exclude them from park drives. The administration measures to exempt motor vehicles from personal property tax and increase registration fees was defeated. A bill authorizing the commissioner of motor vehicles to increase the number of special inspectors to thirty and to appoint men from other state departments upon request, passed both houses, but was not approved.

An extraordinary session of the Ohio Legislature passed a general license bill to take the place of the law of last year that was declared unconsitutional. It provides a fee of $2 for motorcycles, $3 for electric vehicles, $5 for all other motor vehicles, and $20 for dealer's license. Chauffeurs must be examined and pay $1 for registration.

Mississippi also enacted a new law for the one declared unconstitutional. It is called a "privilege tax" act and fixes the rates at which motor vehicles are permitted to use the roads as follows: Motorcycles, $2.40; electric vehicles, $4.80; commercial vehicles up to 4,400 pounds capacity, $8.40; and exceeding this capacity, $16.80; all other motor vehicles 36 cents per horsepower. The funds go for road improvement and repair. A flat fee of $2 is required for registration and number tag.

Only one bill of more than local interest was enacted in Virginia. It prohibits driving a truck, tractor or traction engine fitted with cleats or lugs that will cause injury to the road over any turnpike that has been treated with bitumen or other binder.

Three other Virginia laws permit local authorities in Accomac, King William and Spottsylvania counties to levy special license taxes to provide funds for construction and maintenance of roads in these mountainous regions. Another prohibits speeding of motor cars between Big Stone Gap and Appalachia in Wise County.

The only bill enacted in South Carolina were local measures permitting special automobile licenses in Beaufort and Oconee counties to increase the road fund.

Proper Method of Shipping Storage Batteries.

In a communication to *Motor Age*, W. H. Conant, of the Gould Storage Battery Company's Detroit office, gives some interesting information relating to the shipping of storage batteries, as follows:

"There is a general impression that storage batteries may be shipped wet or dry, as the occasion may seem to demand, and that the only difference between the two conditions is the presence or absence of sulphuric acid. As this impression may cause considerable damage to batteries and unsatisfactory operation of starting and lighting systems that might be charged to battery failure, it is important to state the true situation. It is not proper to pour the liquid from a storage battery and ship it, or even let it stand, in this so-called dry condition.

"If the negative plates of a battery be exposed to the air while in a charged condition, the lead sponge with which they are filled rapidly becomes oxidized. This oxidization is so rapid as to cause very marked heating of the plates. Undue heat in storage batteries is always harmful, but in this situation it is especially so. Here are three reasons:

"1. The oxidization of negative plates is in reality a discharge which results in a coating of lead sulphate over the active material. This coating, while similar in character to that of an ordinary discharge during regular operation, is much more severe and extensive. From long exposure to the air, it is carried much farther than usual and takes on a white appearance as compared with the normal yellow color. This white sulphate is very difficult, and sometimes impossible, to reduce so as to restore good capacity.

"2. The effect upon positive plates is in some respects similar, except that no heat is generated. The sulphate thus

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formed sometimes responds to treatment when given very long, low charges with subsequent cycles of discharge and charge to restore capacity, but often is beyond repair in a commercial sense.

"3. Wood separators as used in most storage batteries are very thin, have been chemically treated so that the strength of their fiber is reduced, and are very porous. When cells are emptied of electrolyte, they retain some quantity of it in their pores. As this is dried out and broken up by the heat, the separators shrink and strain so as to open cracks that render them defective for further use.

"It is evident, therefore, that a dry battery as above cannot be brought back to a normal or healthy condition except by dint of great effort and then only in the minority of cases. Let us consider a battery shipped from the factory without electrolyte.

"If treated, wet, wood separators be used, a sulphating action is set up by means of this moisture which evaporates from the wood and the surrounding air. This produces a result somewhat similar to that from emptying a charged battery, though not as extreme. If, on the other hand, dry, untreated, separators be used, deleterious substances remain in the wood which will injure the plate when the electrolyte is ultimately added and charging begun.

"Whatever the condition of plates and separators after a period of standing without electrolyte, nothing beneficial happens from the mere addition of dilute sulphuric acid when it is desired to place the battery in service. Furthermore, an ordinary charge does not put the battery in normal condition.

"When storage batteries are assembled in the course of manufacture, they are put through a process called developing. This includes a long charge at a low rate until the plates' substances are in the proper state to perform the opposite electrolyte action known as discharging. The plates are further charged and discharged until capable of delivering the desired capacity in ampere-hours. This process is just as important in creating the storage feature of a battery cell as the material of which the parts are made. It thus should be clear that:

"1—Storage batteries should never be shipped dry except in a knocked-down condition.

"2—Batteries must not be emptied of their electrolyte except by one familiar with battery practice, and

"3—The putting in service of newly assembled or dry batteries must always be preceded by a proper developing process.

"The writer's paper last January before the Society of Automobile Engineers on storage batteries attempted to explain in a semi-technical manner the construction and principle of such batteries. The glossary of battery terms following this paper, and which may be found in the *S. A. E. Bulletin* for December, 1913, is intended to simplify the matters touched upon above."

New York City Has Fine New Garage.

A new Exide battery depot has been opened on Twenty-third Street near Tenth Avenue, New York City, by the Exide Battery Depots, Inc. The garage is equipped with every modern accessory for the handling and maintenance of electric vehicles and the charging of vehicle storage batteries. There is room for 100 commercial electric cars and with its equipment it is believed to be the largest public garage in the country. Electrical service is supplied by the United Electric Light & Power Company. This company, through its electric vehicle department, has been conducting a vigorous educational campaign.

Tariff for British Electric Vehicles.

The Electric Vehicle Committee has circularized all English electric supply authorities recommending tariffs to be introduced for encouraging vehicle-charging business. For charging during periods of off-peak load, a maximum charge of two cents per unit at the supply authority's declared system and pressure is suggested. Very little charging, it points out, should be necessary during hours of maximum load, especially for commercial vehicles. It is advised that as low a rate as 1.5 cents per unit should be offered to encourage charging between eleven p. m. and six a. m., with a special discount to large consumers, and a further 20-per-cent discount for energy purchased by consumers for resale. A minimum charge of 48 cents is recommended for any one charging operation including the housing of the car during charging.

Receiver Asked for Standard Electric.

The United States district court has been petitioned by stockholders of the Standard Electric Car Company, Jackson, Mich., to appoint an interlocutory receiver for the concern in order to safeguard the assets and property pending a final decree in the case, it is stated. The petition is filed in the name of E. C. Divine, Chicago, but represents a number of the holders of stock. Besides the above, the petition makes defendants of the officers and directors.

Motor-Trucks in Active Demand, and New Sales Policy Increasing the Business.

With each recurring season a substantial increase in the utilization of the motor-truck is being realized. This is true of both the electric and gasoline types. A more intelligent conception of service requirements, upon the part of manufacturers of motor-vehicle accessories, and a more reasonable understanding of the limitations of the equipment within its capacity, upon the part of users, have caused a remarkable advance in the sales of this modern medium of transportation.

"Two or three years ago," says a writer in the *Journal of Commerce*, New York, "long-headed men predicted that the 'mushrooms' of the business were bound to be thrown overboard and their sensational selling methods eliminated before the rest could expect to make much headway, and that ultimately there would remain a few substantial companies, making a dependable product, selling it on business principles and at a price which appealed to the hard-headed business man as worth while. When that time should arrive, they said, business men would buy trucks freely and readily at profit-bearing prices, and would learn to use them well enough to make unnecessary much of the absurd 'coddling' that the makers of that time claimed to be necessary.

"Recent conditions lead the conservative trade leader to believe that these predictions are coming true. A few of the large companies are making and selling motor-trucks on the same sharp economies and conservative claims as other machinery is sold; their trucks are making good their claims, they have brought maker and user into unity of purpose and responsibility, and the repeat orders—where the profit lies—are coming in with gratifying regularity. Yet, the sensationalism which prevailed a few years ago in selling and advertising methods is no longer in evidence.

"Several of the more conservative companies are doing excellent business at a good profit. Take, for instance, the Pierce-Arrow Company in the gasoline-truck field. It had had only one size truck until within a few months, and now has only two, and sells them at a high price, on stiff terms and only to discriminating customers. According to the claims of the former ideals of the former truck field operators, it should have been unable to make any progress because it would not 'meet the price.'

"The fact remains, however, that the Pierce company has perhaps as many five-ton trucks as any other company

Books on Electric Vehicles

"The Electric Vehicle Hand-Book"

By H. C. Cushing, Jr. and Frank W. Smith

Fellow Am. Inst. Elec. Engrs., Publisher of "The Central Station," the official organ of the Electric Vehicle Association of America. President Electric Vehicle Association of America and Vice Pres. United Electric Light & Power Co., New York.

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II.—Lead Storage Batteries; Descriptive Lead Batteries; Charge and Discharge Rates; Care of Storage Batteries.
III.—Care of Lead Storage Batteries; Assembling and Putting New Batteries into Condition; Charging; Charging Overnight; Emergency Charging; Inspection; Electrolyte; Cadmium Readings; Lead Burning.
IV.—Commercial Types of Lead Storage Batteries.
V.—Alkaline Storage Batteries; Description and Care.
VI.—Charging Apparatus and Charging Stations; Alternating Current Apparatus; Isolated Plants.
VII.—Measuring Instruments, Electrical and Mechanical.
VIII.—Wheels, Rims and Tires; Their Care.
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XI.—The Chassis, Its Components, Their Upkeep.
XII.—Association and Publications Identified With the Development of the Electric Vehicle.
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The automobile hand book is a work of practical information for the use of owners, operators and automobile mechanics, giving full and concise information on all questions relating to the construction, care and operation of gasoline and electric automobiles, including road troubles, motor troubles, carburetor troubles, ignition troubles, battery troubles, clutch troubles, starting troubles. With numerous tables, useful rules and formulas, wiring diagrams and over 330 illustrations.

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The perusal of this work for a few minutes when troubles occur, will often not only save time, money, and worry, but give greater confidence in the car, with regard to its going qualities on the road, when properly and intelligently cared for.

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"I consider the Gould Battery by far the best both as to mileage and durability.

"One of the big advantages in purchasing a Gould Battery is the splendid attention given by your service station. I always found you solicitous as to frequent inspections.

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"The attention you give patrons is especially valuable, inasmuch as the average electric vehicle owner knows little about care of batteries."

Our unvarying instructions to representatives are to help all Gould Battery users with good attention, and good advice on how to keep their batteries free of faults. We wish to make strong satisfaction stronger—we stay close to customers so they will stay close to us.

We can and will give every assurance of splendid service, high mileage per charge and long battery life.

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in successful and efficient operation and is booking repeat orders rapidly. In this city and immediate vicinity, for instance, according to a list issued not long ago, it has in operation almost 150 trucks in the hands of seventy-five owners. Of these, six owners operate forty in the aggregate, showing the operation of repeat orders.

"Then there is the General Vehicle Company, which has been conservatively managed for longer than any of the truck sales companies. It openly advertises that it has more than 4,000 trucks in operation with success and is selling them so fast that its factory is driven to the limit. Its recent development of industrial trucks has opened a new and immensely productive field.

"Then there is the General Motors Company, making both gasoline and electric trucks and recently in the limelight by its adoption of a sales policy which startled the trade and started business men to thinking of motor-trucks in a new way entirely, with the result that the company has had all it could attend to to fill orders. Its refinement of design, where the company has been able to standardize its trucks to something like 80 per cent, leaving only 20 per cent to be done in adapting the chassis either to gas or electric power, has been a step forward in meeting the business man's ideas of economy.

"'The unusual severity of the past winter has,' says W. K. Chilcott, 'in my opinion, been one of the largest factors in the big increase over any similar period in the number of motor-trucks that were brought and placed in operation in this country.'

"Business concerns in many instances simply had to buy motor-trucks in order to get their goods delivered on time, keep their customers satisfied, and meet competition of other concerns in the same line of business. The contrast between horse efficiency and motor-truck efficiency in transportation work was never before so clearly demonstrated as during the recent winter months. Concerns that used horses found their delivery department often crippled, while the users of motor-trucks kept their goods moving on schedule, practically the same as in other months of the year. The best evidence, of course, has been furnished by those concerns that employ both motor-trucks and horses.

"Then there is the Federal Company, which has been working along the lines of guaranteed service and harnessing up all its Eastern stations in a co-operative service chain. This has been a practical evolution which has proved popular with business men, and has given the company an unusually active demand for its product.

"The White Company is doing a rushing business, according to reports from Cleveland. Current sales of motor-trucks reported by the company include twenty-three trucks sold to department and dry-goods stores, giving the White Company a total of over 600 trucks in the service of 150 leading retail establishments.

"All of which would indicate that the companies which have adopted the conservative basis of the business man as their own and sought to meet him on his own ground are finding that the field for motortrucks is continuous and profitable."

Year's Gain by Public Service Corporations.

Based upon the annual reports of earnings furnished *The Financial World* for the fifth annual public service corporation review by 286 of the leading companies for the fiscal year 1913, and which appear in this number, the showing made must prove very gratifying to all interested in this particular field of enterprise.

The tabulated aggregated earnings reflect a healthful and normal increase in gross and net earnings, despite the fact that in other avenues of enterprise it has proven difficult to maintain earnings and profits up to a point where they would indicate no shrinkages as compared with the former year's business.

Gross earnings of these 286 companies for the year were $866,416,400, or $54,857,676 greater than a year ago. The percentage of increase was 6.76 per cent; net earnings were $370,801,186, a gain of $19,492,267, or 5.55 per cent, and surplus after all allowances for fixed charges and dividends, was $81,113,567, a gain of $2,655,893, or 3.54 per cent.

During the year these 286 companies disbursed to investors in interest on bonds, including all other charges, $150,223,407, which was $10,787,446, or 7.73 per cent more than a year ago, and in dividends there was paid $130,777,354, which amount was $5,881,041 greater than in 1912, or a gain of 4.72 per cent.

From the above tabulation it is apparent that the public service corporations in every respect have forged ahead both in gross and net revenues and in the profits and interest they have been able to divide with those whose capital has made their financing possible and successful. While the surplus over all charges and dividends shows a smaller ratio of increase, this is due to the fact that during the year the 286 companies increased their bonded debt by $87,820,793, the charges on which absorbed profits and cut into the surplus account.

This increased indebtedness was incurred principally for improvements and extensions which have not yet had much of an opportunity to develop additional traffic and revenues, but when they get fairly into play they are expected to add proportionately to the revenues of the companies.

What should attract the most marked attention is the vast amount of capital which has been invested in this class of enterprises and which can be taken as a reliable index of the prominent position these companies occupy in the development of our country.

Statistics indicate that the 286 companies have outstanding $2,151,842,261 in bonds. This is $87,820,793 more than in 1912; a total of preferred stock of $592,007,950, which is $18,821,721 greater, and common stock of $2,216,766,418, or an increase of $38,392,053. This is a total investment in public service corporation enterprises covering gas, electric light and power, telephone and telegraph, street railway and interurban transportation corporations of over 4,900,000,000.

No stronger proof could be asked for or furnished to support the argument that, next to the steam railroads, the greatest volume of capital has flowed into public service enterprises. The fact that the business has steadily developed into larger proportions with each year has shown the wisdom of this form of investment.

Of all industries none has evidenced a better ability to withstand adversity than public service enterprises.

Annual Meeting of Chicago Electric Vehicle Association.

The third annual meeting and election of officers of the Chicago Section Electric Vehicle Association of America, will be held on Tuesday, May 5, at 6:30 p. m., in the Louis XVI Room, Hotel Sherman, Chicago, Ill. President F. W. Smith, of New York City, will be present and speak on "The Past, Present and Future of the Association." Other men prominent in the trade will attend and speak on subjects of interest to all connected with the vehicle industry. Every body interested in electric vehicles is invited to attend—vehicle men, accessory men, garage men, users and prospective users. The meeting will be informal and tables will be arranged for groups of six each. Tickets may be obtained from the secretary, W. J. McDowell, General Motors Truck Company, the price being $2.00 per plate.

The Union Pacific Railway will soon resume experiments on the wireless communication with moving trains. These tests will probably be begun at Omaha, Neb.